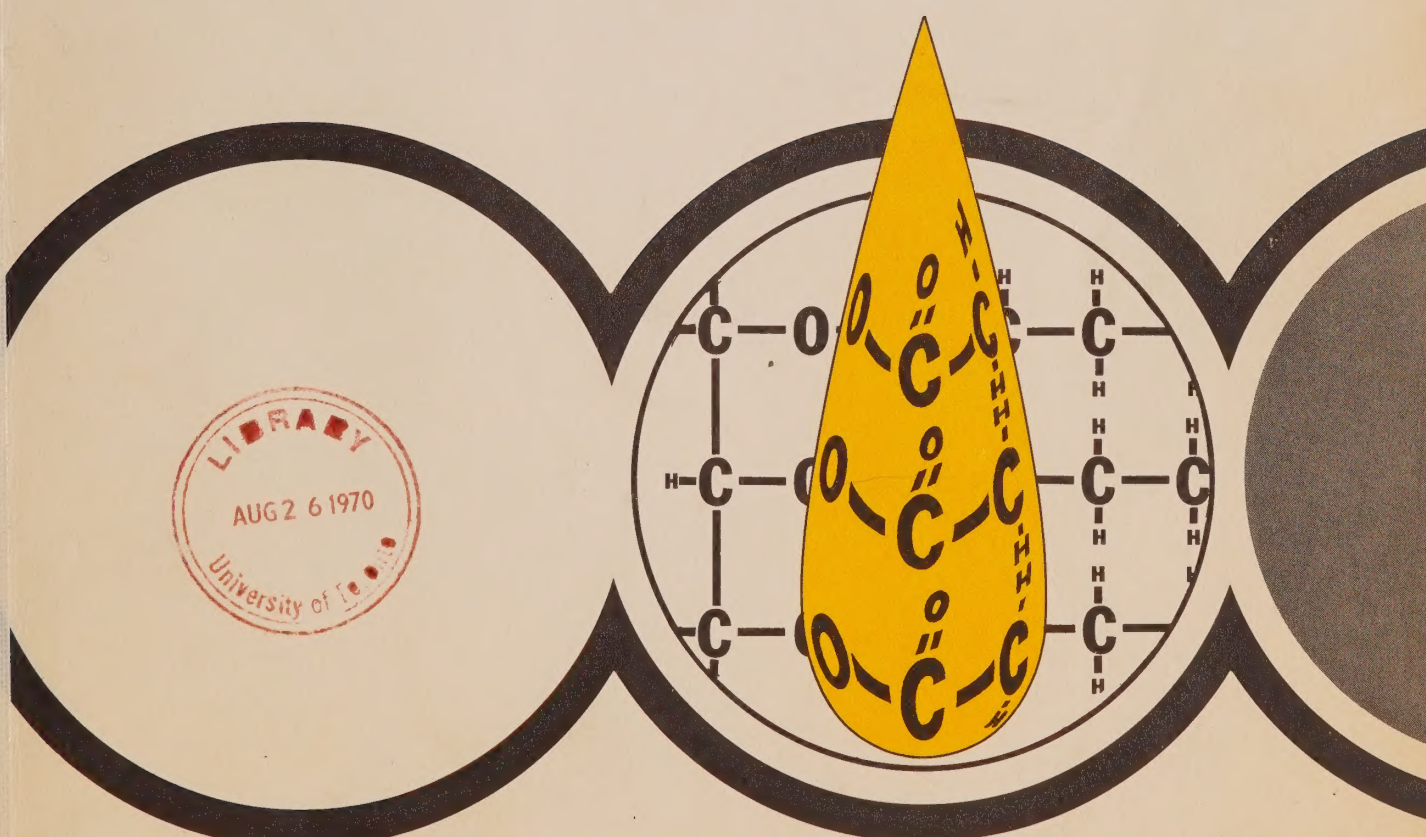
fats and oils in canada
annual review 1969



DEPARTMENT OF INDUSTRY, TRADE AND COMMERCE

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FATS AND OILS IN CANADA

Annual Review

March 1970

Prepared by: Edible Oils Section
Bakery, Cereals and Edible Oils Division
Agriculture, Fisheries and Food Products Branch
Department of Industry, Trade and Commerce
Ottawa 4, Canada

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INTRODUCTION

This is the fifth issue of "Fats and Oils in Canada," prepared by the Agriculture, Fisheries and Food Products Branch. Instead of two semi-annual issues, there will be in future one annual review covering both the crop year and calendar year. The current issue deals with the calendar year 1968 and the crop year 1968/69.

"Fats and Oils in Canada" contains in one publication statistical information of relevance to the fats and oils industry in Canada, as well as an interpretation of these data. In addition, "Fats and Oils in Canada" reports on significant technical and economic developments in Canada and abroad which are likely to affect the Canadian industry.

The Canadian statistical data are based on material provided by the Dominion Bureau of Statistics, the Department of Agriculture, the Department of Fisheries, as well as by the Trade Commissioner Service of this Department. Additional statistics are obtained from a variety of domestic and foreign sources.

"Fats and Oils in Canada" is meant to be a working document for people concerned with the development of the Canadian fats and oils industry. Suggestions and comments on this publication are welcome.

If you wish to have your name or that of your company added to our mailing list, please write to:

Edible Oils Section
Bakery, Cereals and Edible Oils Division
Agriculture, Fisheries and Food Products Branch
Department of Industry, Trade and Commerce
Ottawa 4, Canada

We would like to draw your attention to the International Conference on the Science, Technology and Marketing of Rapeseed and Rapeseed Products, to be held at Le Chantecler Hotel, Ste. Adele, Quebec from September 20–23, 1970. This Conference promises to become an important milestone in the development of the rapeseed industry.

Further details can be found in the section "Canadian Review" of this issue, just in front of Table 1.

Bernd Weinberg

RAPESEED OIL UTILIZATION

by
Ragnar Ohlson
Research Laboratory
AB KARLSHAMNS OLJEFABRIKER, Karlshamn, Sweden

PAPER PRESENTED AT CANADIAN COMMITTEE FOR FATS AND OILS
MEETING IN TORONTO, OCTOBER 18, 1968

I have been invited to give you some information about utilization of rapeseed oil in Sweden. From an international point of view the Swedish market for edible fat is quite insignificant. Sweden is a small country with a population of about eight million people. Nevertheless, I hope you will find it interesting if I give you an account of the way in which the Swedish industry, in co-operation with agriculture, has succeeded in solving the rapeseed oil problem.

Fat Consumption

As a background for my review I would like to present some figures about the fat market in Sweden and show the production of edible fats and oils in 1967.

butter	65,000 metric tons
household margarines	100,000 metric tons
bakery margarines	20,000 metric tons
liquid oils	2,400 metric tons

The total consumption of butter and margarine amounted to about 198,000 tons in 1967. Together with the invisible fat, fat consumption in Sweden is thought today to be about 40 per cent of the total calorie intake.

As you can see the utilization of rapeseed oil is closely connected with margarine. Consumption of margarine has risen during the period 1950 to 1967, while that of butter has fallen. It is particularly interesting to know that per capita consumption of edible fats in Sweden has fallen since 1964. The probable explanation for this is the consumer reaction to current discussions of the nutritional aspect of edible fats. This debate has pointed out that some people should reduce their intake of fats and that in certain cases, only fats containing a considerable amount of polyunsaturated fatty acids should be eaten.

The Margarine Industry

Almost all vegetable oil used in Sweden is consumed as margarine. Therefore the utilization of rapeseed oil is closely connected with the Swedish margarine industry. This industry not only realized the value of structural rationalization at an early stage, but also managed to bring about a pooling of resources. At the beginning of the Second World War, about 25 factories were manufacturing margarine, while today only three factories produce more than 90 per cent of the margarine consumed in Sweden.

The Swedish consumer is quality conscious, a fact that ties in with the high standard of living. This in itself justifies taking a close look at Swedish experience in using rapeseed oil mainly for margarine production.

Three years ago an "easy-spread" refrigerator margarine was launched in Sweden. This has given the margarine factories a consumer product line consisting of three brands. A dietetic margarine is also distributed through pharmacies. The refrigerator margarine has been very successful in capturing a considerable share of the market.

Apart from the effective marketing and information about the nutritional value of margarine, the most important factor accounting for this success has been a pronounced improvement in quality – brought about as a result of systematic teamwork, with regard to the treatment of oilseeds and fats.

Regulations Regarding Fats

Government controls of the fats and oils industry which have been in operation for the past three decades originated during the crisis of the 1930's. Parliament decided in 1933 that the margarine industry should help support butter sales by means of an excise tax on margarine. From 1940 – 1956 the import of raw materials for margarine was strictly controlled. With the introduction of large scale cultivation of oilseed crops on a more permanent basis in 1944, imports were restricted for the most part to coconut oil and marine oils.

On September 1, 1967 a new agricultural policy was introduced with the target of maintaining an 80-per-cent self-sufficiency in Sweden. The aim of this new policy is that agriculture shall be self-supporting and internationally competitive to the greatest possible extent. According to this new policy, controls on milk are to be abolished for the most part over a five-year period. Even if the proposals of the agricultural commission mean an increasingly liberalized policy for agriculture, we can count on a long transition period with serious interference in the market for edible fats by recurrent unloadings of cold storage butter.

Production of Rapeseed

The main source of vegetable oil in Sweden is rapeseed. Although the famous Swedish scientist Linne described cultivation of rapeseed in the beginning of the 18th century, it was not grown in Sweden for edible use until the First World War and then from 1940 until now. Oilseeds can, therefore, be regarded as a relatively new crop for Swedish agriculture. Since the Second World War, this crop has become increasingly important. The total oilseed producing area and the cultivation in recent years has amounted to approximately 100,000 hectares, three per cent of Sweden's arable land, and the quantity of oilseed harvested has been about 200,000 metric tons during the past few years. Table A shows the production of different varieties of Cruciferae oils.

TABLE A

Production of oilseeds in Sweden (in 1000 metric tons)

	1960	1962	1964	1966
Br. napus, winter type	42	99	99	46
Br. napus, summer type	3	4	23	18
Br. campestris, winter type	8	20	30	12
Br. campestris, summer type	0.4	1	2	4
Sinapis alba	3	20	32	7
	56.4	144	186	87

Although rapeseed must be regarded as a special crop produced by a limited number of growers (there are about 15,000 of them), it plays an important role in crop rotation, which is of value to Swedish agriculture in general. Thanks to their deep root systems, the rapeseed plants aerate the soil and enrich it with easily decaying material. However, by far the most important reason for oilseed cultivation in Sweden has been the need for national self-sufficiency in times of emergency.

Most arable land in Sweden is suitable for oil plant cultivation. Oilseeds have not become fully acclimatized in Sweden as yet, but essentially growing conditions may be regarded as favourable in the long run. Highly promising plant breeding work, centered mainly in rapeseed with a high oil content, has been carried out for several years at the Swedish Seed Association in Svalov. Among its goals is the development of varieties with greater yields of oil and with special properties suited to the Swedish climate such as early maturing, greater winter-hardiness and better straw-stiffness.

The oil crops lend themselves to mechanical cultivation and large-scale production

techniques, especially with regard to pest control. This, together with constantly rising labour cost, makes them especially suitable for very large farms under expert management. Oil plants are by no means easily cultivated crops. On the contrary, they demand great skill on the part of the grower. Table B shows how yields per hectare increased in accordance with the grower's competence. It should be pointed out however that requirements usually result in higher yields than growers can achieve in actual practice.

TABLE B

RAPESEED YIELDS	Brassica napus	Yield per Hectare	
Winter Type		**Summer Type**	
Average crop	2,800 kg	Average crop	1,800 kg
Local test	3,200 kg	Contract growers	2,300 kg
Tests made by the Seed Association	4,500 kg	Choice growers	3,000 kg

It is also interesting to compare the yield per hectare of winter rape to winter wheat. Table C shows that the rapeseed harvest, though definitely lower than the wheat harvest if measured by weight, gives a higher yield in terms of calories.

TABLE C

YIELD COMPARISONS

Production	Rapeseed Winter Type	Wheat Winter Type	Milk
Seeds, kg	2,600	3,680	– –
Milk, kg	– –	– –	4,000
Available protein	475	330	130
Available fat	1,100	45	160
Available carbohydrate	380	2,320	200

A similar comparison between rapeseed growing and milk production shows that rapeseed gives more than four times the yield per unit of area. The picture becomes still more favourable for rapeseed if we compare the fat yield. Apart for reasons of national preparedness or as emergency planning, therefore, it is very much in the interest of the national economy to reduce the butter production and to increase the manufacture of margarine. In this way available resources of the national economy are utilized more effectively.

Processing of Rapeseed

The observations concerning the tendency of rapeseed oil to oxidize have led to intensive work within Sweden to prevent deterioration at all stages of handling from the harvest of the rapeseed to the manufacture of margarine.

Close collaboration maintained between the margarine industry and the growers' trade association offers promising possibilities for improving domestic seed material. It has facilitated the study of defects in seed quality and the dissemination of information about growing and harvesting conditions for seed growers and seed drying firms. We can expect action in the immediate future which may make it possible to produce a Swedish vegetable oil with even better colour, flavour and storage qualities. Growers are currently paid on the basis of the water and oil content of their seed, but there is discussion that the quality grading system should take

into account additional standards such as purity and ripeness. The following data shows the factors we like to see controlled:

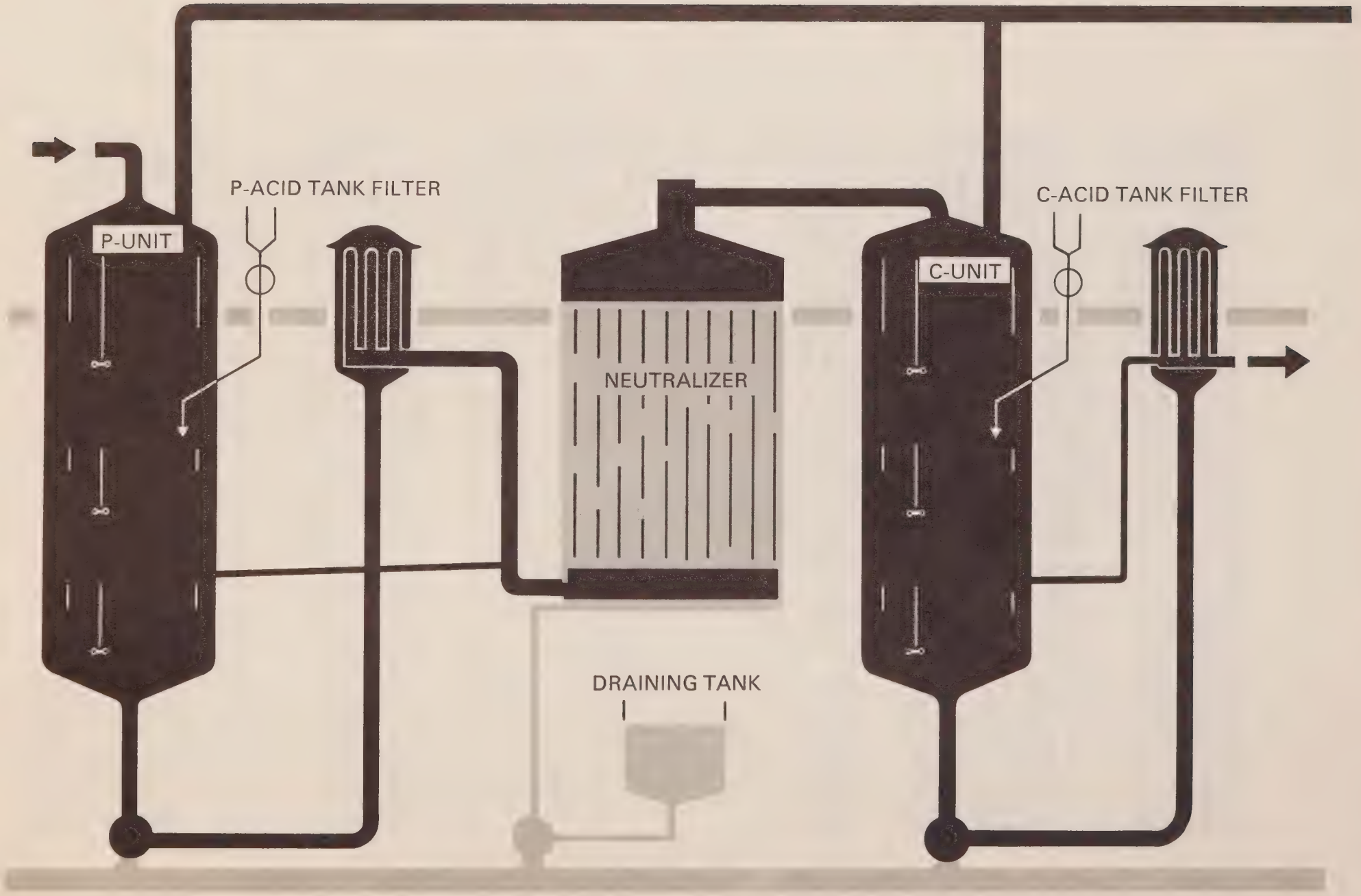
water	6,5 – 8,0%
purity	$\geq$ 98%
colour	$\leq$ 25 ppm chlorophyll in the oil
FFA	$\leq$ 1,0%
vitality	$\geq$ 85%

The material should also have a good shape and be free of any smell.

As work on the development of a first class seed has proceeded, several innovations have taken place in the Swedish rapeseed oil extraction mill. Rapeseed is being cleaned by separating broken, immature and otherwise unsuitable seeds. Storage, pumping and transport of oils are carried out by methods minimizing contacts with air and at as low as possible a temperature.

Processing methods at the refineries have been systematically studied and improved. One result of this has been the development of the hermetic Alfa-Laval refining system. Another is the patented apparatus for continuous refining – the so-called Zenith-process.

FIGURE 1


P-ACID TANK FILTER
P-UNIT
NEUTRALIZER
C-ACID TANK FILTER
C-UNIT
DRAINING TANK

Oxidation Tendency of Rapeseed Oil

With the advent of the first substantial rapeseed crop in 1944 there was a marked reduction in the oxidation tendency of margarine. Unfortunately, however, the expected increase in flavour stability of margarine did not occur. Apparently rapeseed oil needed to be handled very carefully.

Laboratory investigation showed that the tendency of refined rapeseed oil to oxidize depended partly on the occurrence of secondary oxidation products which were formed in the rapeseed oil as the result of the decomposition of peroxides.

Study of these secondary oxidation products showed that they consisted in part of unsaturated aldehydes. Some of these could be eliminated by deodorization. Others were decidedly non-volatile, tasteless and odourless and could not be removed. These non-volatile products accelerate both the formation and decomposition of peroxides during storage of the oil.

These problems led to the development in Sweden of a practical method of analysing the secondary oxidation products, which has later been adopted by the IUPAC under the name of the benzidine value. In addition to determining the peroxide value, this method made it possible for oil and margarine factories to estimate the extent of oxidation in oils more systematically than before, and all the way from the seed through processing and to the production of the finished margarine. The lowest benzidine value attainable in each process by the proper refining of a crude oil having a known peroxide number and benzidine value, was determined. Deviations from this value enabled us to pinpoint improper treatment of the oil in the refinery. The values indicated that even good refining techniques could not eliminate more than a fraction of the oxidation products present in a crude oil. This has resulted in a determined insistence on low benzidine and peroxide values in the crude oils used for margarine manufacture. Development work in this case has been very favourable, and Table D shows that the peroxide and benzidine values for both crude and deodorized rapeseed oil were greatly reduced between 1950 and 1966.

TABLE D

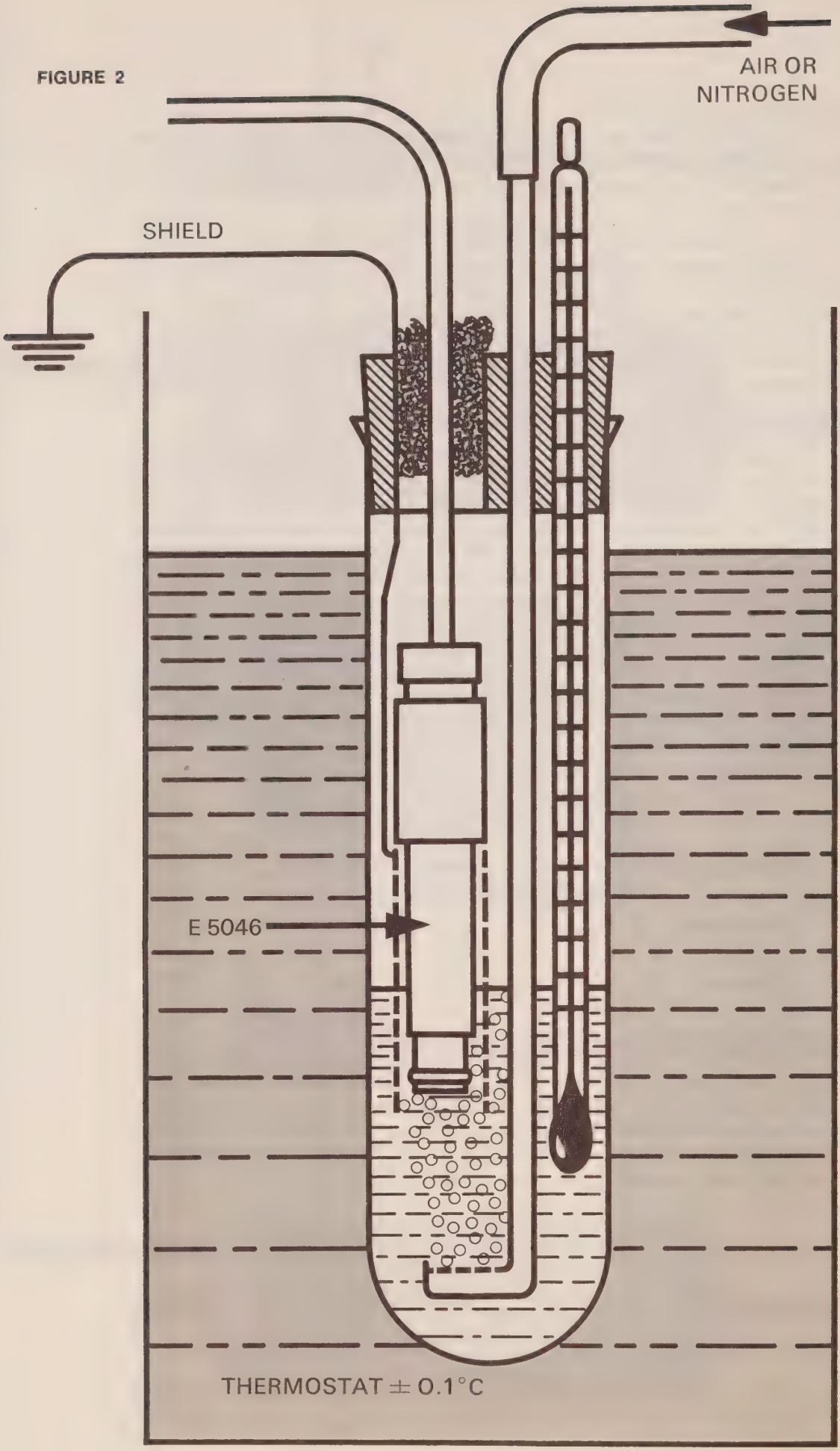
Peroxide and Benzidine Values in Rapeseed Oil 1950 and 1966

	1950		1966	
Rapeseed Oil	PV	BV	PV	BV
crude	2-6	1-5	< 2	1
deodorized	<1.0	5-15	<0.05	2

Oxygen Uptake of Rapeseed Oil

This deterioration of rapeseed oil has been studied from the most fundamental point of view — that is the oxygen uptake of the oil. The sorption process between oxygen and oil includes physical solution of oxygen, diffusion and a chemical reaction. Our aim has been to develop a simple and reliable method for measuring the amount of oxygen found in an oil or taken up during the various stages of processing in the factories. The determination of dissolved oxygen is carried out by a pH-meter with a special oxygen adapter.

FIGURE 2



The instrument was calibrated by keeping the electrode in the air and adjusting the value. The instrument has an automatic temperature compensation. The electrode can be used for measurements in solution up to +50°C. By leading air into various oils a saturation value attainable for oxygen from air was determined. For all vegetable oils studied this value was about 143 torr from the instrument calibrated at 160 torr. The dependence of the sorption rate of oxygen on various factors was also studied.

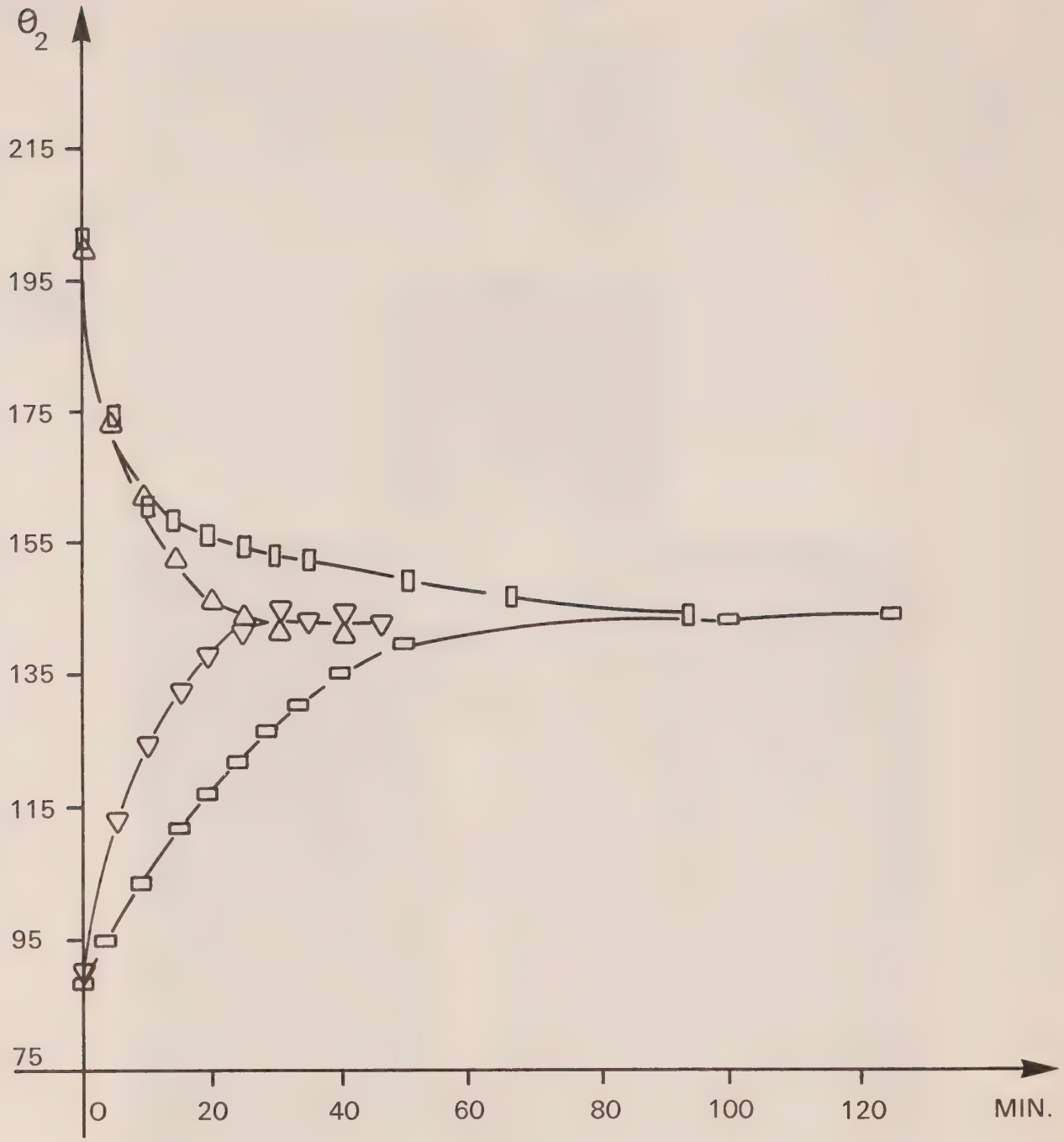
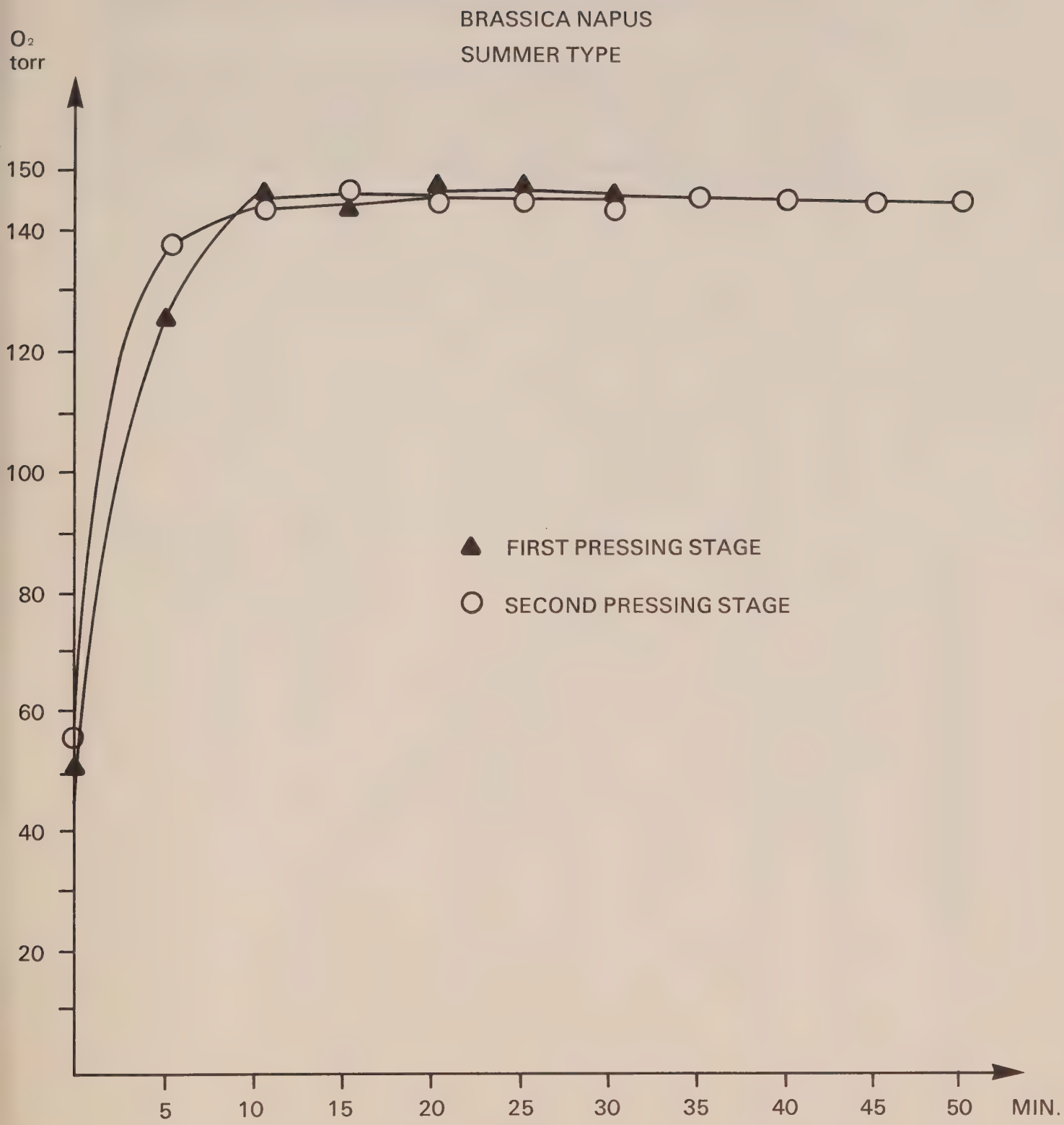

θ2
215
195
175
155
135
115
95
75
0
20
40
60
80
100
120
MIN.
22°C
50°C
50°C
22°C

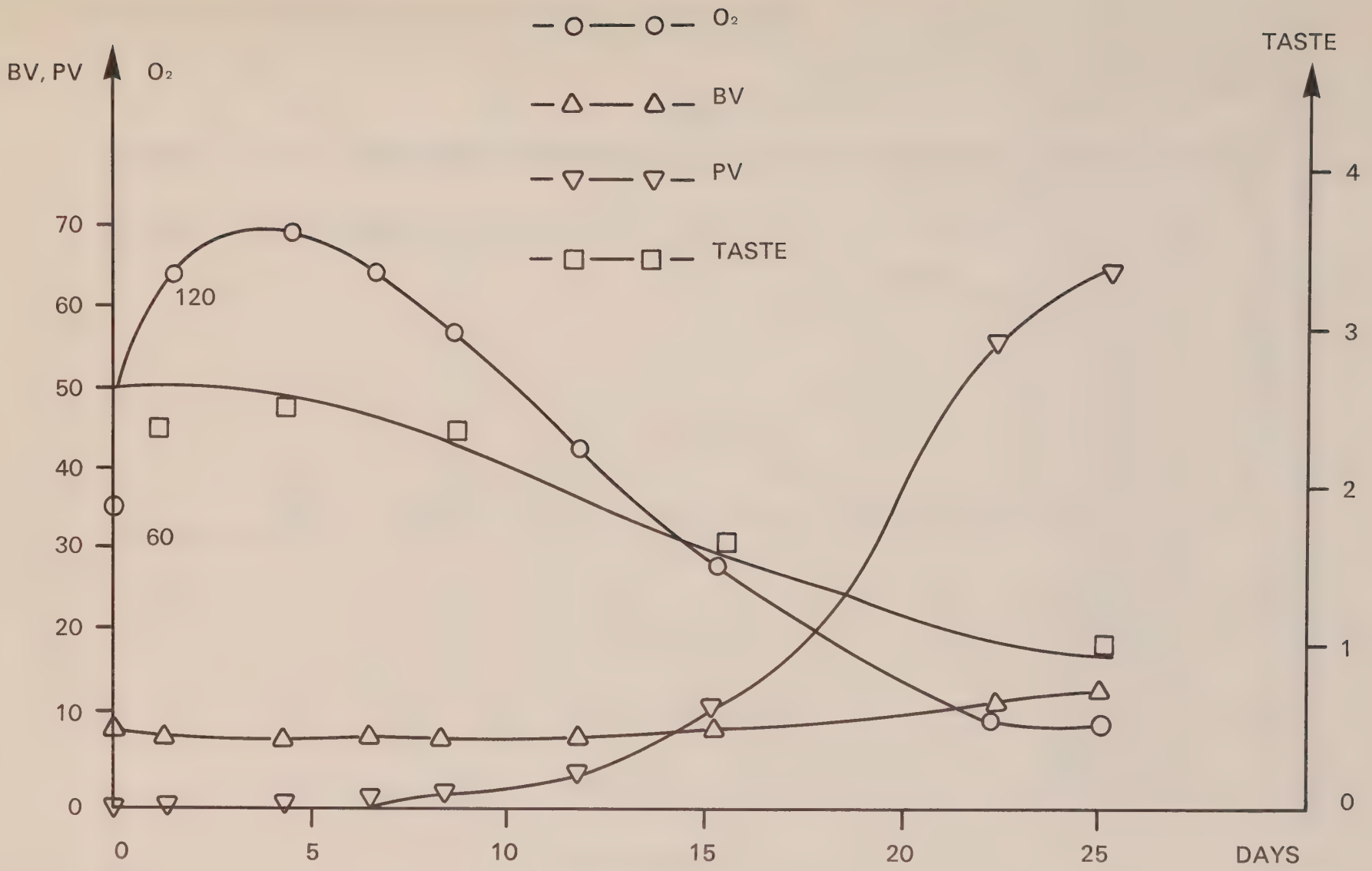
FIGURE 3

FIGURE 4


BRASSICA NAPUS
SUMMER TYPE
O2
torr
150
140
120
100
80
60
40
20
FIRST PRESSING STAGE
SECOND PRESSING STAGE
5
10
15
20
25
30
35
40
45
50
MIN.

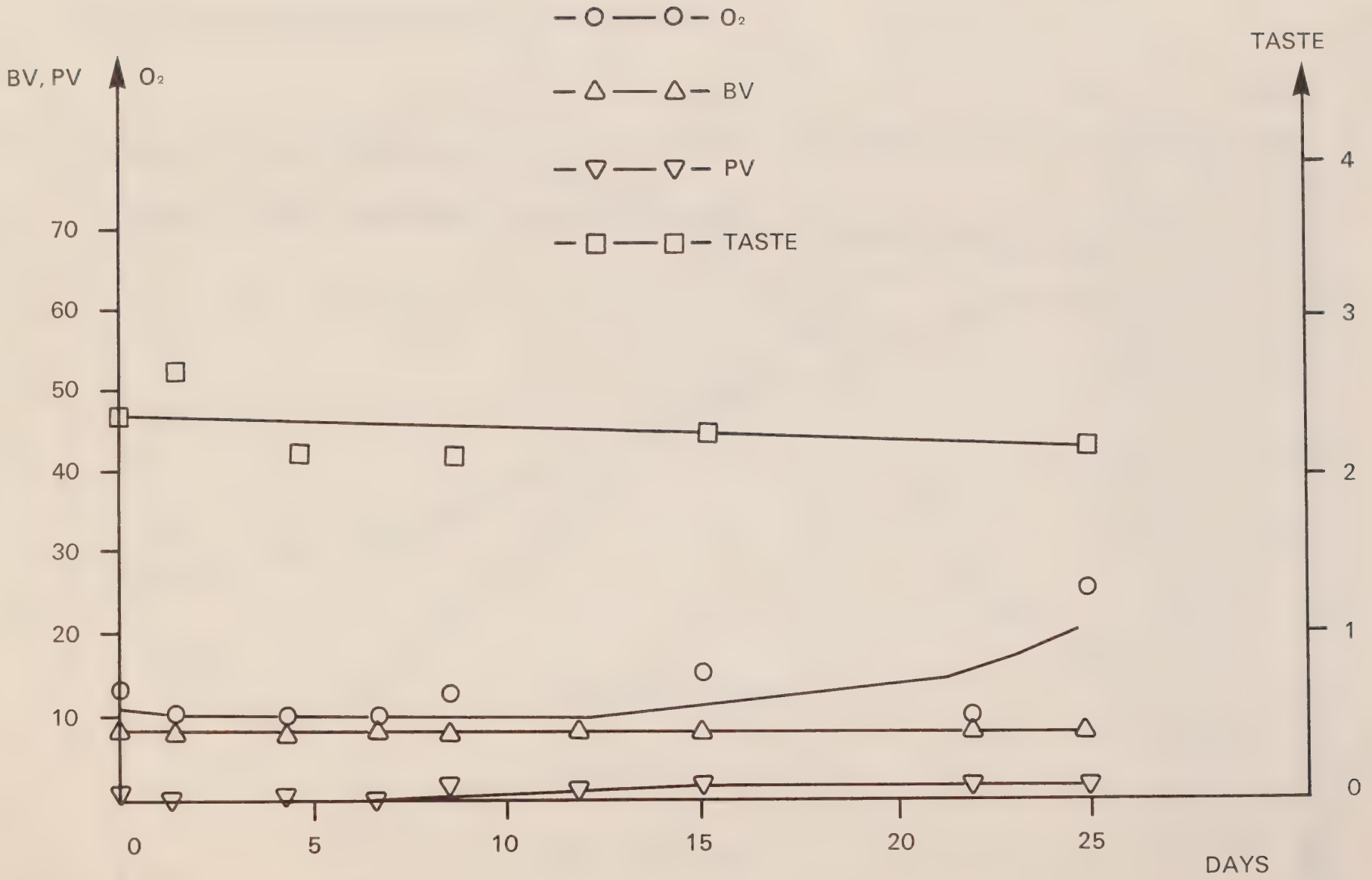
Different treatments of the oil have a varying effect on the sorption rate. Refined oils, for instance, absorb oxygen more rapidly than the corresponding crude oils. The same applies to hydrogenated oils.

The mechanism for the oxidation of natural fats is complicated, especially because one must take into account the effect of natural or synthetic anti-oxidant systems. With a low oxygen content in the liquid phase and an equilibrium between the gas phase and the liquid phase, it may be assumed that the rate of autoxidation is proportional to the partial pressure of oxygen. Figures 5 and 6 illustrate the dramatic difference in quality that can be obtained when rapeseed oil is stored without contact with air.



THE OXIDATION OF AN OIL STORED WITH AIR CONTACT

FIGURE 5



THE OXIDATION OF AN OIL STORED WITHOUT AIR CONTACT

FIGURE 6

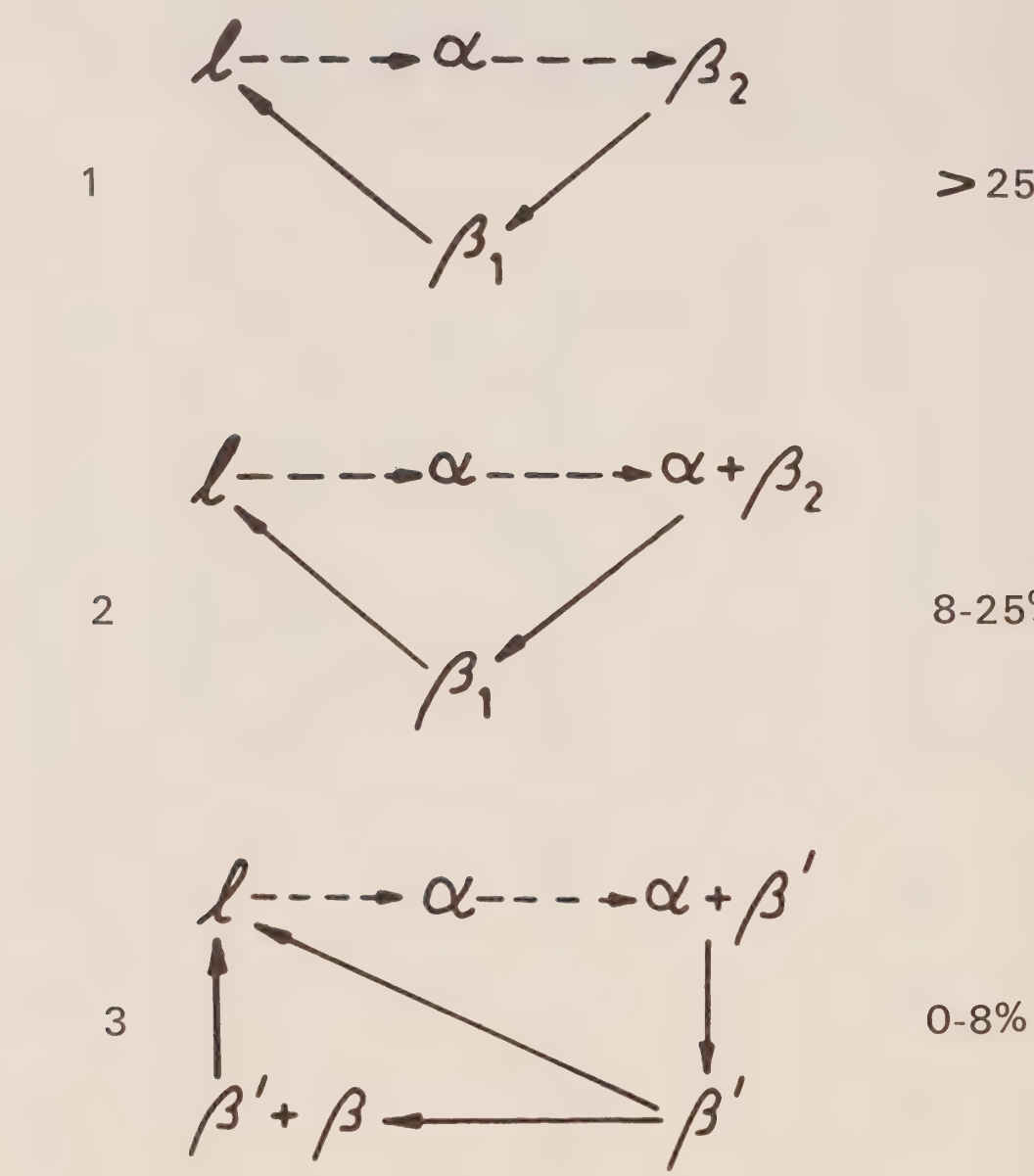
After the most urgent problems in connection with oxidative stability of rapeseed oil had been solved, research turned to the problem of consistency in connection with the use of rapeseed oil in margarine and shortening. Rapeseed oil is characterized by its high content of erucic acid, and this will give special properties to the fat.

Polymorphism of Rapeseed Oil

The polymorphism of rapeseed oil and hydrogenated rapeseed oil has been investigated by X-ray diffraction analysis with a new DPT-camera. The polymorphism of Brassica oils is characterized by definite transitions between phases. On cooling rapeseed oil, crystallization takes place at about -20°C into a crystal form named β_2, which transforms to the usual β form, named β_1, with the triclinic chain packing, T$\parallel$. This polymorphism is unique among the usual commercial vegetable oils and can be used for the purpose of identification. The polymorphism of different samples is summarized in Figure 7.

FIGURE 7

Polymorphic transitions in *Cruciferae* seed oils



For different hydrogenated rapeseed oils the lifetime of the α form on crystallization from the melted material has been measured. This quantity can probably be used in the analysis of the relationship between the production conditions and the properties of the margarine.

The connection between the polymorphic transition on crystallization and the thermal effects is illustrated in Figure 8.

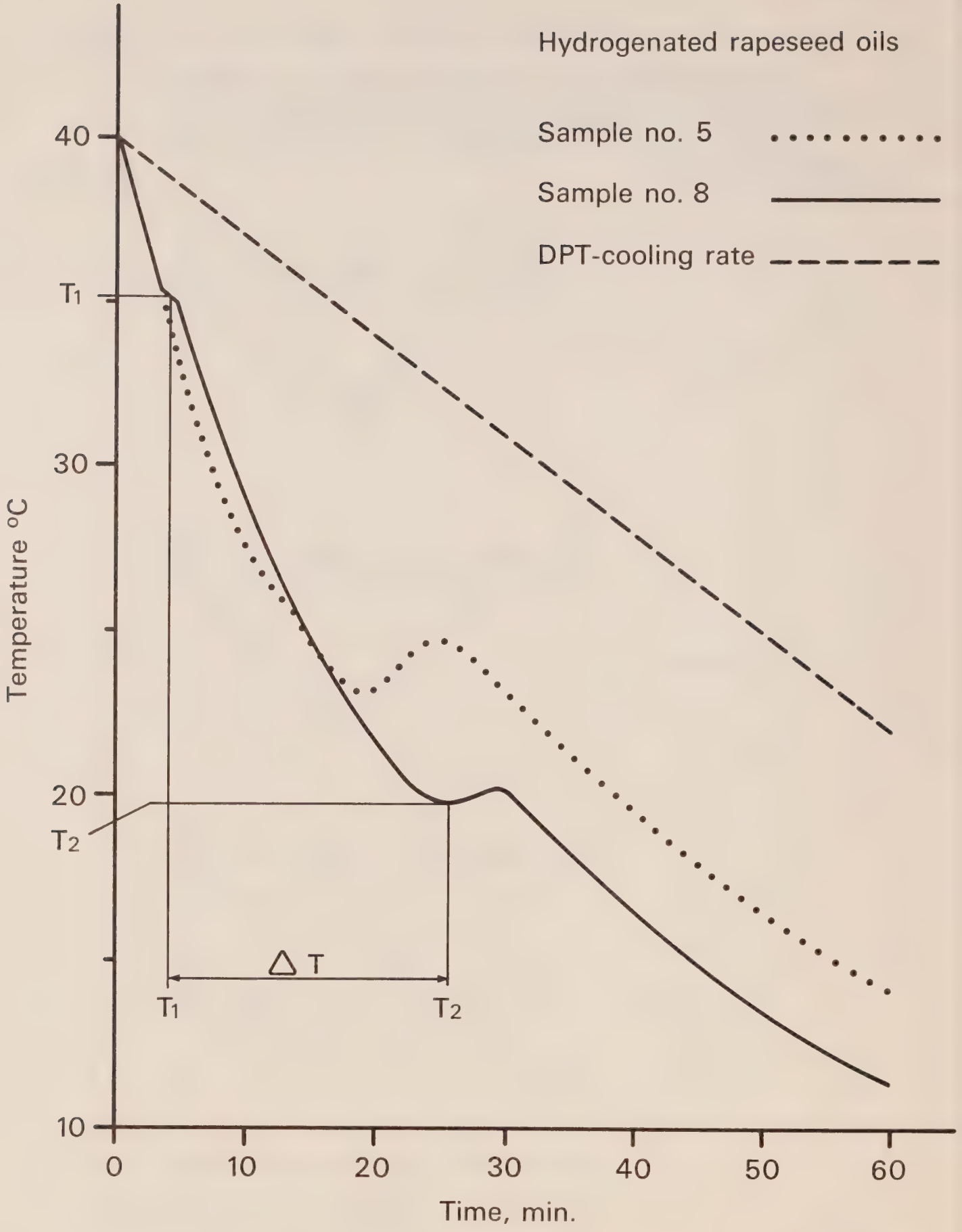

Hydrogenated rapeseed oils
Sample no. 5
Sample no. 8
DPT-cooling rate
40
30
20
10
T1
T2
Δ T
T1
T2
Temperature °C
0
10
20
30
40
50
60
Time, min.

FIGURE 8

It shows the thermal cooling curve for two of the oils determined according to Wilton and Wode. The temperature T_1 indicates the point where the time-temperature curve first deviates from the curve for a non-crystallizing glyceride mixture, e.g. soybean oil. The temperature T_2 indicates the temperature for the minimum point. It can be seen in Table E that T_1 coincides within 1-2°C with the transition temperature for liquid to the α form in the DPT experiment and that T_2 coincides with the transition temperature for the α to β^1 form:

TABLE E

LIFETIME OF THE α FORM AT THE CRYSTALLIZATION OF HYDROGENATED RAPESEED OILS

Sample No.	I.V.	Dilatation, mm $^3/_g$ a)					DPT-diagram			Thermal cooling curve		
		10,	20,	30,	35,	40, (°C)	t_α 1 → α min	$\alpha \rightarrow \beta'$ °C	°C	Δ t min	T_1 °C	T_2 °C
5	70.2	50	34	13	3.9	0.6	13	26	22	7	26	23
6	68.8	53	44	19	8.5	1.7	21	30	24	10	29	24
7	64.2	61	56	33	19	8.3	28	35	26	12	33	26
8	73.6	41	32	17	12	7.7	50	36	21	21	35	20

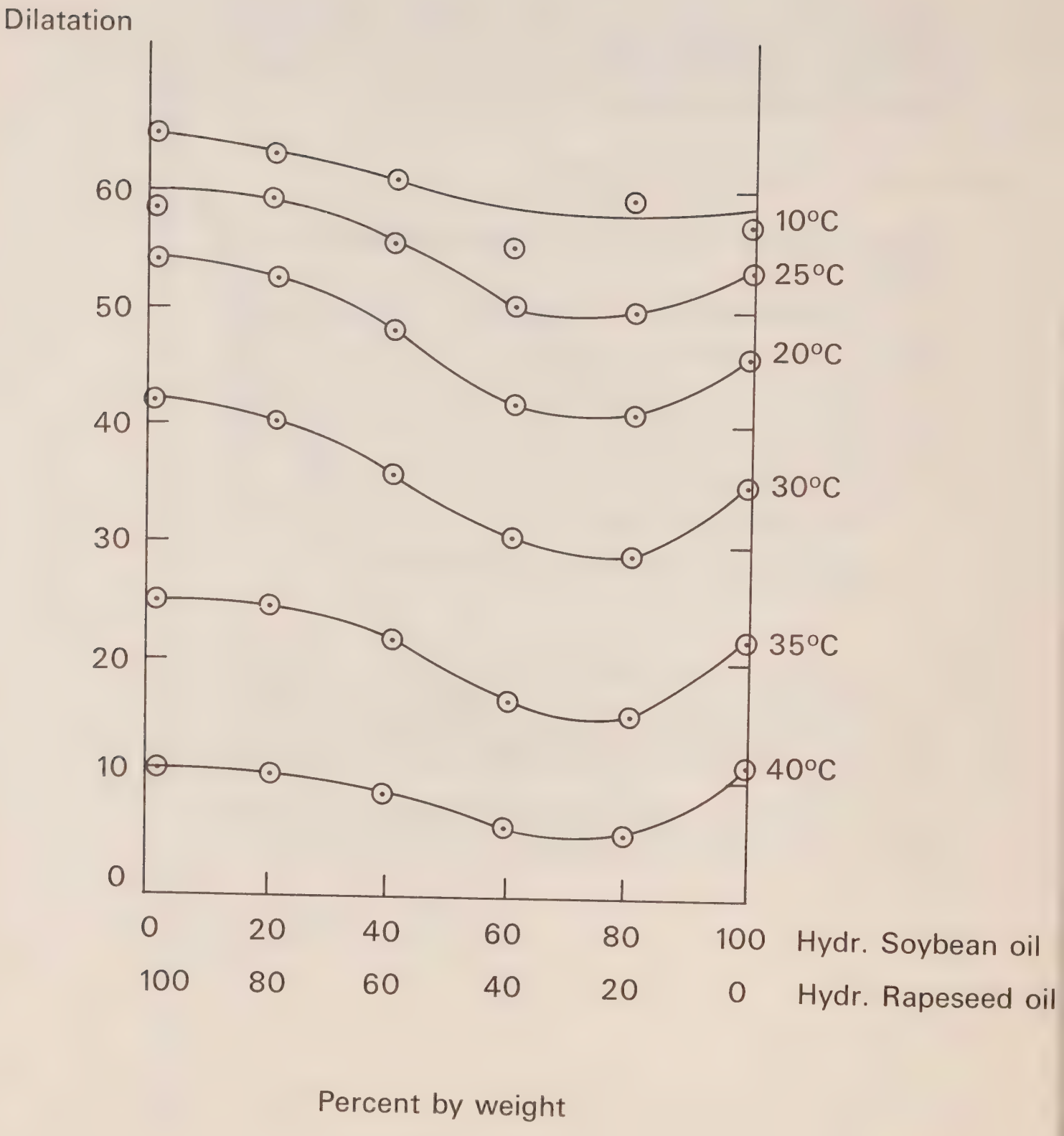
a) Dilatation calculated per g of sample

Method C-V IIa(53), DGF-Einheitsmethoden, Stuttgart, 1950-1965.

The lifetime of the form consequently depends only on the rate of cooling between T_1 and T_2, and therefore the difference $T_1 - T_2$ can be regarded as a measure of the α state lifetime under equal rates of cooling. This measure can probably be used in the analysis of the conditions for the large-scale production of crystallized fat products. It should be borne in mind, however, that great differences exist between the conditions of these experiments and actual plant practice.

In order to know how much of e.g. hydrogenated rapeseed oil could be used in a margarine blend, it is necessary to know something about the solubility of this rapeseed oil in different other types of oil. Two examples are given in the next two Figures, 9 and 10.

FIGURE 9


Dilatation
60
50
40
30
20
10
0
10°C
25°C
20°C
30°C
35°C
40°C
0 20 40 60 80 100 Hydr. Soybean oil
100 80 60 40 20 0 Hydr. Rapeseed oil
Percent by weight

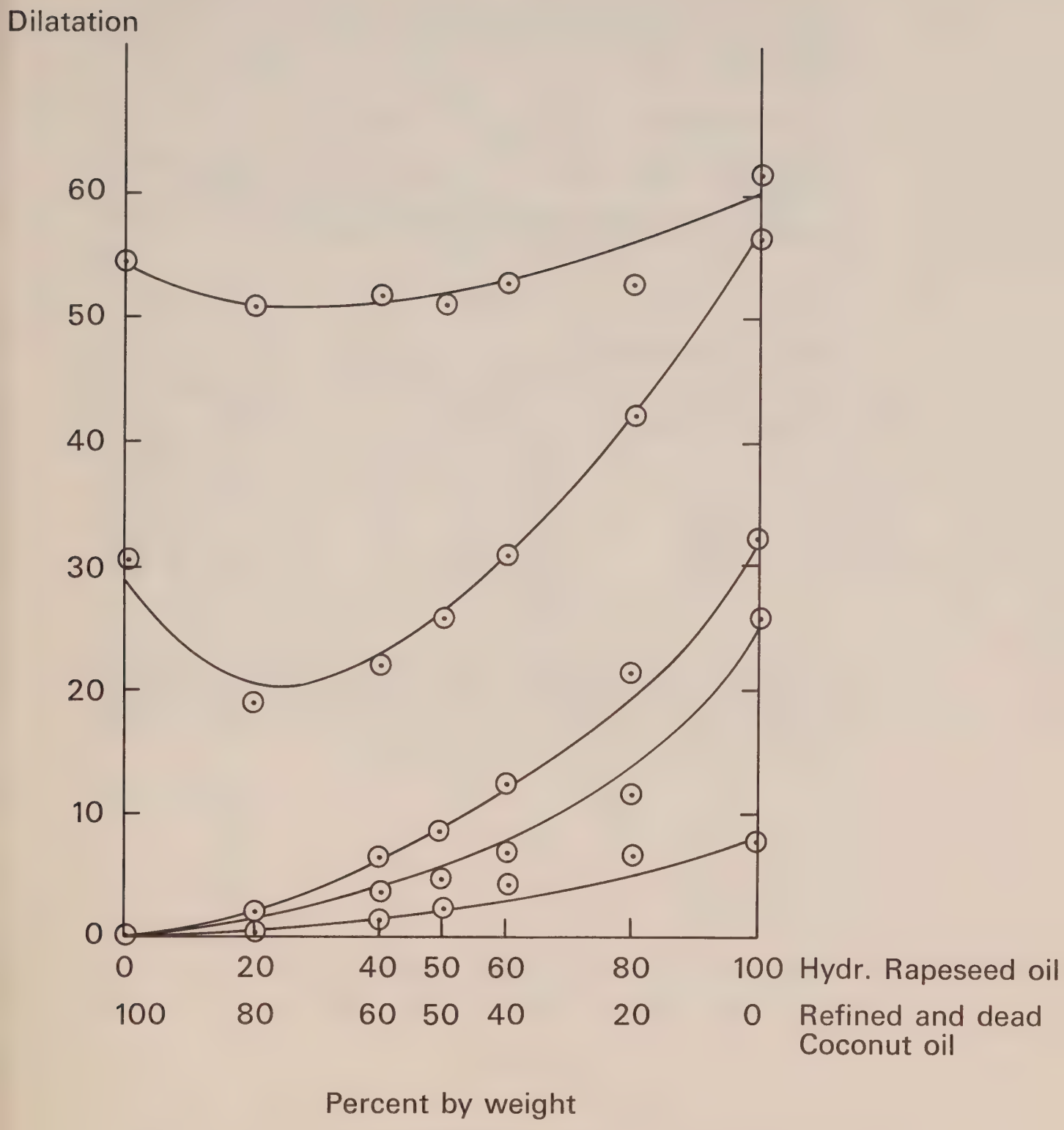

Dilatation
60
50
40
30
20
10
0
0
20
40
50
60
80
100
Hydr. Rapeseed oil
100
80
60
50
40
20
0
Refined and dead Coconut oil
Percent by weight

FIGURE 10

For the evaluation of the rheological properties, i.e. the consistency of margarines and shortening, the methods developed by Haighton are applied routinely. The yield values are determined before and after a thorough "kneading" in the absence of air and at constant temperature. The so-called work softening is calculated from these two figures, and expressed as follows:

$$\text{Work softening} = W = \frac{C_u - C_w}{C_u} 100$$

C_u = yield value from the original sample and C_w = yield value with the sample that has been "kneaded."

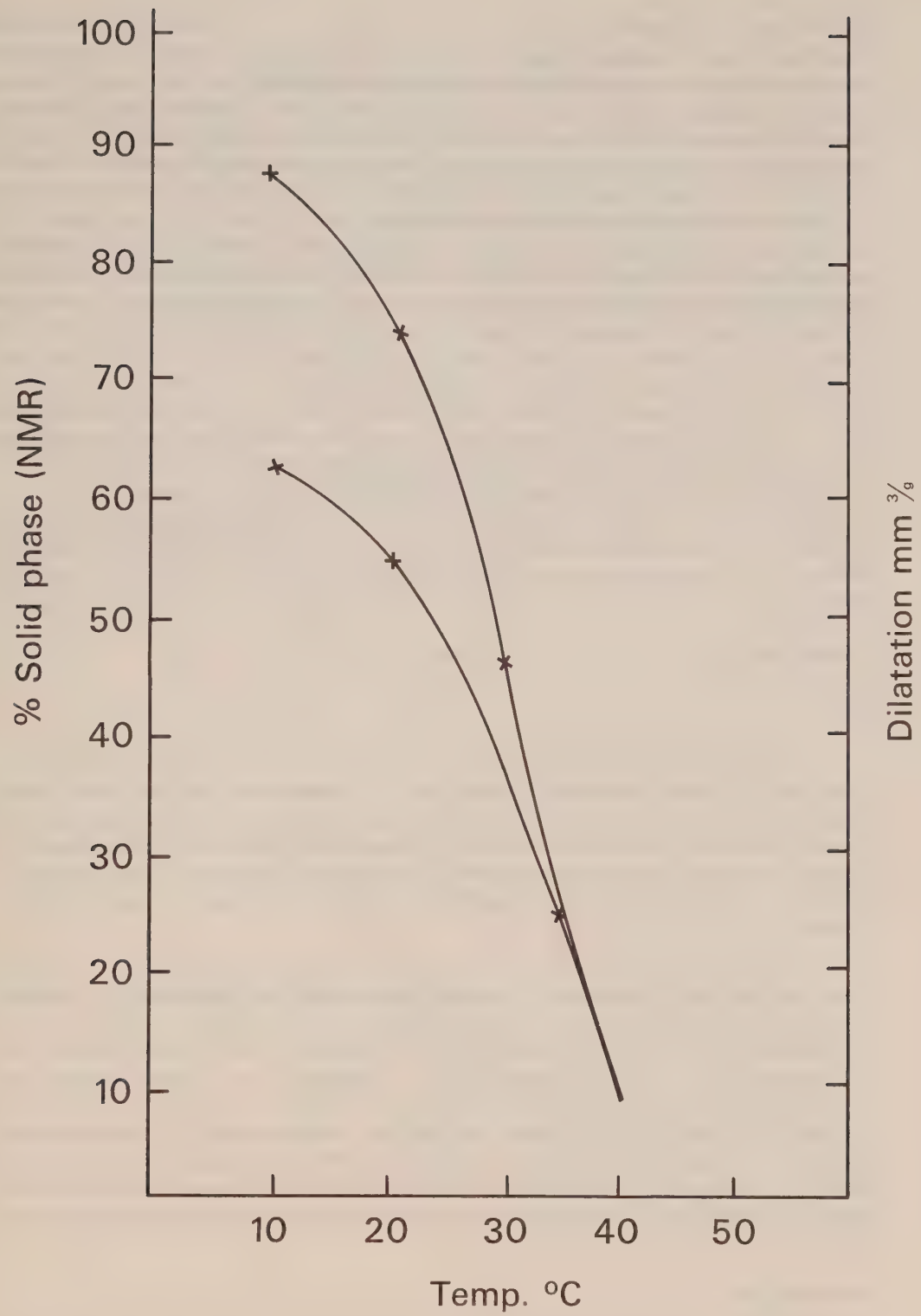
Table F shows some measurements of the consistency at 15°C in a margarine in which the coconut oil has partially been exchanged for hydrogenated rapeseed oil.

TABLE F

Consistency at 15°C in margarine

Coconut oil/ hydrogenated rapeseed oil	Consistency C_u(g/cm^2)			Work softening W %		
	1	2	Mv	1	2	Mv
40/0	860	760	810	74	72	73
30/10	800	740	770	72	72	72
20/20	680	770	735	64	70	67
10/30	770	830	800	63	66	65
0/40	1200	1200	1200	68	68	68

In a margarine blend there exists an equilibrium between the solid and liquid phases, and it is the amount and type of solid phase that determines the consistency of the product at a given temperature. It is therefore essential to have a theoretically correct method for measuring the percentage of solid phase and this has been achieved with NMR. The correlation between the NMR method and the dilatation method is shown in Figure 11.



NMR and dilatometric valves as functions of temperature

FIGURE 11

Breeding Work on Oilseed Crops

I am very well aware of the excellent breeding work done in Canada, but I will also say some words on the work carried out at the Swedish Seed Association in Svalov.

The general aim of oil crop breeding from the growers' standpoint is to produce a domestic raw material which can compete with imported oils in price and quality. With this in mind, research at Svalov has concentrated on developing rapeseed with a higher content of linoleic acid and lower proportions of linolenic and erucic acids. Another aim is the alteration of the glucoside composition in the seed material.

To show the progress that has been made in plant breeding, Table G provides a comparison of soybean oil, the present Swedish rapeseed oil, oils from improved rapeseed (which are undergoing tests) and oils from the rapeseed that the plant breeders expect to be able to produce in the future.

TABLE G

FATTY ACID COMPOSITION OF VARIOUS RAPESEED OILS AND OF SOYBEAN OIL

Oil	Soybean Oil	Commercial	Rapeseed Oil Tested 1968	1975?
Stability	2	2	2	2
Erucic acid %	0	50	0	0
Linoleic acid %	50	15	32	50
Linolenic acid %	8	10	10	5

These data show the proportions of erucic, linoleic, and linolenic acids in the various oils. The desire to increase the content of linoleic acid in rapeseed arose from nutritional considerations. Considerations of the nutritive value of margarine which is rich in polyunsaturated acids — more than eight to ten per cent, and which can be obtained with the present rapeseed oil — resulted in attempts to increase the content of linoleic acid. The motivation for reducing the proportion of linolenic acid of rapeseed oil originated in the hope of improving flavour stability.

In connection with the discussion of the content of polyunsaturated fatty acids in food there has also been a discussion of the human requirements for α-tocopherol. An American research group demonstrated a few years ago that human beings probably need about 0.6 mg of α-tocopherols for every gram of linoleic acid they consume. Few oils have such a high content of α-tocopherol in relation to linoleic acid, but rapeseed is one of them. Another plant improvement project would be the production of rapeseed oil having such a high content of saturated fatty acids, primarily palmitic acid, that the oil would solidify at room temperature. According to the plant breeders, this could perhaps be achieved but nobody knows whether the consistency of coconut oil would be duplicated by the new oil. A vegetable fat which could be used in margarine without hardening must nevertheless be regarded as a very valuable addition to industry's supply of raw material.

Technical Uses

Rapeseed oil has at the present time some technical uses mainly as a result of the high content of erucic acid. Breeding work is going on to increase this content and thus make the oil more useful.

The breeding of new rapeseed varieties having a high content of linolenic acid could lead to the use in epoxidized glycerides as plasticizer, e.g. in PVC.

Studies on the use of rapeseed oil as a cold rolling lubricant have been carried out in Canada during recent years.

The Future of Rapeseed

Based on the prospects which I have outlined, it seems promising to invest in continued rapeseed improvement. My confidence in the potential open to the plant breeders may seem great, but I am of the opinion that their achievements so far have been remarkable. They have demonstrated in many other cases that their work produces beneficial results both quantitatively and economically. Oilseed growers have therefore reason to expect a good future arising out of further work on rapeseed and other oil plants. The margarine industry is also following their progress with great interest and we are contributing financially towards these efforts.

There are ample grounds for expecting a continuation of the spirit of co-operation which has been established between agriculture and the margarine industry in working toward a solution of the rapeseed problems. It is not only the prospect of a more efficient Swedish agriculture that encourages such a change in conditions. The development work on oilseeds would mean that Swedish oil will be able to compete with the best imported oils. It is therefore my opinion that the targets can be achieved possibly within the not too distant future. Even during the next few years, improvements in the quality of Swedish rapeseed will be achieved by adjusting the quality standards on which payments for rapeseed are made to the farmer.

We shall probably succeed in freeing rapeseed meal of the glucosides. This meal, which even now is a valuable high protein cattle feed, will then lend itself to a new range of applications. As food technology advances, different kinds of oilseeds can become sources for the production of special foodstuffs with a high proportion of valuable protein. This would be important for a large part of the world's population which is undernourished due to a lack of high-quality protein.

CANADA, SEPTEMBER, 1970

INTERNATIONAL CONFERENCE ON THE SCIENCE, TECHNOLOGY AND MARKETING OF RAPESEED AND RAPESEED PRODUCTS

An "International Conference on the Science, Technology and Marketing of Rapeseed and Rapeseed Products" will be taking place under the joint sponsorship of the Department of Industry, Trade and Commerce, and the Rapeseed Association of Canada.

The three-day Conference will take place at the Chantecler Hotel, St. Adele, Quebec, about 45 miles north of Montreal, from September 20-23, 1970.

The following program has been arranged:

September 21

World Production and Marketing of Rapeseed

- Production and Marketing of Canadian Rapeseed
- World Production and Marketing of Rapeseed
- International Discussion Panels on Production and Marketing

Nature and Causes of Variation in Canadian Rapeseed Quality

- Genetic Differences
- Variations in Chemical Composition
- Seed Grower's Viewpoint
- Seed Crusher's Viewpoint
- Grading of Canadian Rapeseed
- Quality Characteristics

September 22

Rapeseed Oil Characteristics and Utilization

- Comparative Characteristics of Rapeseed Oil
- Food and Industrial Uses and Future Potential:
  - Food Processors
  - Industrial Uses
  - European Views

Rapeseed Meal Utilization: Present and Future

- Nutritional Properties of Rapeseed Meal
- Rapeseed Meal as Poultry Feed
- Feeding Rapeseed Meal to Swine
- Rapeseed Meal for Ruminants

September 23

Rapeseed Research Trends: Present and Future

Canada

- Rapeseed Utilization Assistance Program
- Rapeseed Oil Research:
  - Processing
  - Human Nutrition
  - Animal Nutrition
- Rapeseed Meal Research
- Objectives of Canadian Plant Breeders
- Rapeseed Protein:
  - Concentration and Isolation for Animal and Human Nutrition

World Wide

- Rapeseed Breeding in Europe
- Nutritional Properties of Rapeseed Oil
- Effect of Processing on Chemical and Nutritional Value of Rapeseed Meal
- Rapeseed Morphology

Conference Arrangements

The Conference will be under the chairmanship of Mr. A. M. Runciman, chairman of the Canada Grains Council, and president of the United Grain Growers and of the Rapeseed Association of Canada.

The date of the Conference in September 1970 has been set to permit participants to attend the Joint Conference of the International Society for Fat Research — American Oil Chemists Society in Chicago, starting September 27, 1970.

Inquiries and requests for registration should be sent to:

Edible Oils Section
Agriculture, Fisheries and Food Products Branch
Department of Industry, Trade and Commerce
112 Kent Street
Ottawa 4, Canada

TABLE 1
Canadian Production of Fats and Oils

(Thousands of Pounds)

	1964	1965	1966	1967	1968
Primarily Edible Vegetable Oils [1]					
Soybeans (oil equivalent)[2]	74,000	85,000	96,000	86,000	96,000
Soybean oil	200,318	198,588	197,867	215,511	191,618
Rapeseed (oil equivalent)[3]	248,000	427,500	484,000	494,000	388,000
Rapeseed oil	34,116	51,808	84,447	100,865	116,413
Sunflowerseed (oil equivalent)[4]	10,000	10,000	10,000	14,000	9,800
Sunflowerseed oil	6,699	6,658	4,432	6,815	11,472
TOTAL[5]	241,133	257,054	286,746	323,231	319,503
Animal Fats					
Edible tallow	49,588	49,950	48,370	48,956	49,664
Lard	108,177	96,769	86,302	109,313	103,451
Butter (as butter oil)[6]	285,000	273,000	270,500	267,000	271,000
TOTAL	442,765	419,719	405,172	425,269	424,115
Marine Oils					
Herring	49,230	48,890	44,397	47,100	49,664
Seal	1,270	2,350	3,294	2,155	2,980
Whale[7]	9,800	6,198	9,361	7,820	7,520
TOTAL[8]	60,300	57,438	57,052	57,075	60,164
TOTAL EDIBLE OIL PRODUCTION	744,198	734,211	748,968	802,575	803,782
Primarily Inedible					
Flaxseed (oil equivalent)	402,000	553,000	468,000	185,000	388,000
Linseed oil	58,935	54,858	48,578	47,238	39,864
Inedible tallow	198,653	204,392	194,113	223,538	263,401
Grease, other than white[9]	5,951	4,846	3,104	16,533	[11]
Other oils and fats[10]	7,792	6,585	10,174	7,205	[11]
Marine oils	9,017	7,545	10,919	7,040	9,000
TOTAL INEDIBLE OIL PRODUCTION[12]	280,348	278,226	266,888	301,554	312,265
TOTAL EDIBLE AND INEDIBLE FATS AND OILS PRODUCTION (excluding oil equivalents of oilseeds)	1,024,546	1,012,437	1,015,856	1,107,129	1,116,047

Footnotes to Canadian Production of Fats and Oils

1 Corn oil and cocoa butter not included, since production data are not published.

2 Oil equivalent of soybeans: this figure refers to the oil equivalent of domestically produced soybeans, using 17.7% as the conversion factor. Actual recovery varies from season to season, being 17.0% on the beans crushed in Canadian mills during the crop year 1968/69.

[3] Used 37.5% as conversion factor for rapeseed oil until 1966. Rapeseed oil yields range currently around 40% in solvent extraction plants for all varieties of rapeseed grown in Canada. Starting in 1967 the conversion factor was changed to 40.0%.

[4] Oil equivalent of sunflowerseed: used 33% as conversion factor until 1967, and 40% starting in 1967. Sunflowerseed production includes a decreasing proportion of birdseed and confectionery varieties. Actual oil yield amounts currently to about 40%.

[5] Includes only edible vegetable oils produced in Canadian mills.

[6] The animal fat total includes the oil equivalent of creamery butter production, but not the total domestic milk fat production.

[7] Whale oil production in 1967 and 1968 includes small amounts of other marine oils.

[8] Salmon and redfish oil suitable for human consumption could not be broken out statistically, and small quantities are probably included under "Marine Oils" in the inedible category, which consists primarily of offal and body oils and sun-rotted liver oils.

[9] Until 1967 white grease was included with Other Oils and Fats, and starting in 1967 was included with Grease.

[10] Includes neatsfoot oil, oleo stearin, oleo stock, etc. and until 1967 also white grease.

[11] Data not available for 1968.

[12] Excludes the oil equivalent of domestically grown flaxseed, for which a conversion factor of 35.4% had been used.

Source: based on DBS data.

TABLE 2
Canadian Imports of Fats and Oils

(Thousands of Pounds)

	1964	1965	1966	1967	1968
Primarily Edible					
Vegetable Oils					
Soybeans (oil equivalent)	194,200	168,500	168,000	171,000	117,000
Soybean oil	34,505	29,946	24,342	23,142	22,315
Cottonseed oil	37,422	47,646	32,225	11,459	10,648
Corn oil	17,067	14,377	20,308	14,021	15,406
Peanut oil	9,647	9,247	31,555	26,624	27,680
Coconut oil	39,750	39,618	42,641	44,567	45,142
Palm oil	13,112	18,913	26,761	21,622	18,736
Palm kernel oil	7,327	9,877	9,182	12,121	12,099
Olive oil	3,705	2,731	3,371	4,546	4,013
Cocoa butter	13,157	13,185	15,545	12,943	16,546
Sunflowerseed oil	– –	– –	– –	34,289	40,097
Vegetable oils and fats	5,256	7,488	38,644	17,436	2,732
Vegetable cooking fats and pack	– –	– –	– –	– –	– –
Salad oils	4,143	9,254	7,714	2,206	1,569
Margarine and shortening	5,129	3,526	4,496	4,134	4,891
TOTAL[1]	384,420	374,308	424,804	400,120	338,874
Animal Fats					
Lard	16,001	20,734	28,439	24,112	28,375
Butter (oil equivalent)	– –	1,350	18,950	7,750	12
TOTAL	16,001	22,084	47,389	31,862	28,387
Marine Oils					
Fish and marine animal oil	980	7,981	10,078	7,867	3,752
TOTAL	980	7,981	10,078	7,867	3,752
TOTAL EDIBLE OILS AND FATS	401,401	404,373	482,271	441,668	371,013
Primarily Inedible					
Flaxseed (oil equivalent)	1,290	123	24	– –	– –
Linseed oil	– –	– –	– –	– –	– –
Castor oil	5,438	6,778	4,627	5,940	5,675
Oiticica oil	246	204	149	21	20
Tung oil	2,860	2,142	2,508	2,148	1,975
Inedible tallow[2]	8,680	8,007	7,002	7,068	17,331
Animal oils and fats	1,337	771	804	441	1,741
Grease[3]	23,589	15,308	10,356	10,805	3,715
Fish liver and visceral oil[4]	105	261	130	– –	– –
TOTAL INEDIBLE OILS AND FATS	43,545	33,594	25,600	26,423	30,457
TOTAL EDIBLE AND INEDIBLE FATS AND OILS IMPORTS	444,946	437,967	507,871	468,091	401,470

Footnotes to Canadian Imports of Fats and Oils

1 Vegetable oil total includes the oil equivalent of the imported soybeans.

2 This class includes both edible and inedible tallow.

3 Grease, including wool grease and lanolin.

4 Starting in 1967 fish liver and visceral oil are included with fish and marine animal oil. The volume of the former class is insignificant.

Source: Based on DBS data.

TABLE 3
Canadian Exports of Fats and Oils

(Thousands of Pounds)

	1964	1965	1966	1967	1968
Primarily Edible Vegetable Oils					
Soybeans (oil equivalent)	20,400	32,200	34,800	25,300	16,500
Soybean oil	25,017	34,727	29,194	42,932	31,370
Rapeseed (oil equivalent)	68,200	199,500	261,500	278,000	289,000
Rapeseed oil	391	5	— —	— —	— —
Sunflowerseed (oil equivalent)	3,460	4,540	6,200	1,970	770
Margarine and shortening[1]	104	168	228	191	201
Vegetable oils and fats	458	677	543	1,100	7,024
TOTAL[2]	118,030	271,817	332,465	349,493	344,865
Animal Fats					
Lard	34	31	1	1	1
Butter (oil equivalent)[3]	29,600	2,370	1,300	44	4
TOTAL	29,634	2,401	1,300	44	4
Marine Oils					
Herring oil	23,291	7,578	790	4,242	337
Whale oil	3,161	4,526	1,425	12,549	5,063
TOTAL	26,452	12,104	2,215	16,791	5,400
TOTAL EDIBLE FATS AND OILS (including oil equivalents of oilseeds)	174,116	286,322	335,980	366,328	350,269
Primarily Inedible					
Flaxseed (oil equivalent)	294,000	319,000	400,000	276,000	217,000
Linseed oil	18,996	22,518	12,359	8,939	22,986
Inedible tallow	137,872	135,564	136,308	145,791	165,888
Marine oils[4]	8,240	7,589	6,687	7,700	8,154
Animal fats and oils	159	129	5,110	9,460	7,961
TOTAL INEDIBLE FATS AND OILS[2]	459,267	484,800	560,464	447,890	421,989
TOTAL EDIBLE AND INEDIBLE FATS AND OILS EXPORTS	633,383	771,122	896,444	814,218	772,258

Footnotes to Canadian Exports of Fats and Oils

1 Starting in 1966, lard exports were included with margarine and shortenings.

2 Oil equivalents of oilseeds are included in all totals.

3 Butter exports have been converted to butter oil equivalents, using a factor of 81%. This procedure was not applied to the margarine and shortening category, since the proportion of margarine was not known.

4 Marine oil exports listed under inedible oils, include sun-rotted cod liver oil, fish and marine oil, fish liver and visceral oils. Most of these oils are assumed to be of a feed grade, although some edible oil may have been included.

Source: Based on DBS Data.

TABLE 4
CANADIAN OILSEEDS: ACREAGE, YIELDS, PRODUCTION

(Crop Year)

CROP	1967	1968	1969	1967	1968	1969[1]
	(Thousands of Acres)			(Yield Per Acre, Bushels)		
Flaxseed	1,023	1,524	2,441	9.2	12.9	12.8
Rapeseed	1,620	1,052	2,012	15.2	18.4	18.2
Soybeans	290	295	322	27.9	30.6	23.6
					(pounds)	
Sunflowerseed	45.8	40	52	864	620	708
Mustard seed	221	533	[2]	678	880	—
	Production			Oil Equivalent		
	(Thousands of Bushels)			(Millions of Pounds)		
Flaxseed	9,378	19,666	31,264	185	388	619
Rapeseed	24,700	19,400	36,700	494	388	734
Soybeans	8,091	9,027	7,599	86	96	81
	(Thousands of Pounds)					
Sunflowerseed[3]	39,600	24,800	34,000	15	10	14
Mustard seed	149,900	469,000	—	—	—	—

1 As indicated by DBS reports of October 1, 1969.

2 Private estimates expect a very substantial reduction in seeded acreage in 1969 compared with 1968.

3 A part of the Manitoba acreage consists of confectionery and birdseed varieties. The acreage in Saskatchewan and Alberta is grown in wide rows, which would lower the yields per acre. Yields per acre and oil equivalents have been calculated on the assumption that
a) all sunflowerseed is of the oilseed variety,
b) no distinction is made between wide-row and narrow-row cultivation.

Extraction Rates:
Flaxseed: 35.4%
Soybeans: 17.7%
Rapeseed: 40.0%
Sunflowerseed: 40.0%
Mustard seed: oil content varies with variety

Source: Based on DBS Data.

TABLE 4A
CANADIAN OILSEED PRODUCTION
BY PROVINCE

	AREA			Yield Per Acre			PRODUCTION		
	1967	1968	1969	1967	1968	1969	1967	1968	1969
	(Thousands of Acres)			(Bushels)			(Thousands of Bushels)		
Flaxseed									
Quebec	17	15	17	14.9	16.4	12.4	253	256	208
Ontario	7	6	3	16.0	16.8	15.3	112	110	46
Manitoba	660	820	1,100	8.6	12.7	10.5	5,200	10,400	11,600
Saskatchewan	193	397	770	8.3	11.6	14.5	1,600	4,600	11,200
Alberta	145	285	550	11.7	15.1	14.9	1,700	4,300	8,200
British Columbia	1.4	0.8	0.9	9.3	11.1	11.1	13	9	10
Rapeseed									
Manitoba	145	91	196	15.9	20.9	17.9	2,300	1.900	3,500
Saskatchewan	600	511	1,000	17.0	20.2	19.2	10,200	10,300	19,200
Alberta	875	450	816	13.9	16.0	17.2	12,200	7,200	14,000
Soybeans									
Ontario	290	295	322	27.9	30.6	23.6	8,091	9,027	7,599
					(Pounds)		(Thousands of Pounds)		
Sunflowerseed									
Manitoba	44	37	48	800	650	708	35,200	24,050	34,000
Saskatchewan	1.8	2.5	3	450	240	[2]	810	600	[2]
Alberta	[1]	0.5	0.5	—	300	[2]	—	150	[2]
Mustard Seed									
Manitoba	29	65	[2]	700	846	[2]	20,300	55,000	[2]
Saskatchewan	78	320	[2]	675	900	[2]	52,650	288,000	[2]
Alberta	114	148	[2]	675	851	[2]	76,950	126,000	[2]

[1] Less than 500 acres.
[2] Not yet available.

Source: DBS #22-002

HIGH PROTEIN FEEDS

At 1,117,000 tons, total high protein feed supplies in 1968 had increased by about two per cent over the 1967 level and were nearly 20 per cent higher than in 1964.

Among the vegetable proteins, which account for 74 per cent of total supplies by volume, soybean meal remains in the dominant position, although its supply calculated on a calendar year basis declined from 552,000 tons to 535,000 tons.

Rapeseed meal supplies continued their advance, and at an estimated 98,000 tons in 1969 have nearly quadrupled since 1964. Nevertheless, rapeseed meal supplies in 1968 amounted to only 15.5 per cent of the available soybean meal. On a protein basis rapeseed meal represents only 30,000 tons compared with 240,000 of soybean protein.

Sunflowerseed meal production increased to 5,100 tons in 1968 from 3,200 tons in 1967.

Fish meal supplies increased from 51,000 tons in 1967 to 71,000 in 1968, i.e. by nearly 40 per cent. The growth of the Atlantic Coast fish reduction industry more than compensated for the disappearance of the herring resource on the Pacific Coast.

Packinghouse by-products increased by nearly 8,000 tons to 207,000 tons in 1968, in keeping with a four-per-cent increase in the tonnage of inspected slaughterings.

When converting some of the data of Table 5 to protein tonnage, the following comparison can be made:

	1964	1967	1968
		(thousands of tons of protein)	
Vegetable Proteins	277	337	339
Animal Proteins	107	142	159
Total Protein Supplies	384	479	498

Total feed protein supplies increased by 30 per cent from 1964 to 1968, and the increase from 1967 to 1968 amounted to 20,000 tons — i.e. four per cent.

TABLE 5
ESTIMATE OF HIGH PROTEIN FEED SUPPLIES IN CANADA

	1964	1965	1966	1967	1968[2]	1969[2]
		(Thousands of Tons)				
Linseed meal	38	26	27	33	29	30
Soybean meal	452	460	479	552	535	592
Rapeseed meal	25	36	60	71	83	98
Other oilseed meals, Gluten feed[1]	64	63	29	27[2]	29	N/A
Brewers' and Distillers' Dried grain and malt sprouts	112	130	147	149	146	N/A
Total Vegetable Proteins	691	712	742	831	822	—
Fish meal	23	32	49	51	71	N/A
Packinghouse by-products	167	190	199	199[2]	207	N/A
Skim milk, buttermilk and whey powder	19	19	16	16[2]	16	N/A
Total Animal Proteins	208	241	264	267	294	—
TOTAL PROTEIN SUPPLIES	899	953	1,006	1,098	1,117	—

[1] Other oilseed meals include sunflowerseed, cottonseed, and n.e.s.
[2] Preliminary and/or partly estimated.

source: DBS, Catalogue No. 22-001.

TABLE 6

Estimated World Production of Fats and Oils

(oil or fat equivalent)

(thousands short tons)

Commodity	Average 1960-64	1962[1]	1963	1964	1965	1966	1967	1968[2]	Forecast 1969
Edible vegetable oils[3]									
Cottonseed	2,479	2,490	2,595	2,685	2,750	2,700	2,395	2,455	2,655
Peanut	2,855	2,860	3,005	3,130	3,325	3,205	3,310	3,455	3,135
Soybean	4,086	4,115	4,290	4,360	4,585	5,050	5,340	5,565	5,615
Sunflowerseed	2,180	2,385	2,590	2,365	3,120	3,100	3,485	3,815	3,615
Rapeseed	1,265	1,310	1,190	1,240	1,670	1,545	1,745	1,845	1,795
Sesameseed	590	595	610	615	670	620	625	640	630
Safflowerseed	187	200	245	195	230	235	300	250	215
Olive oil[4]	1,323[5]	1,475	1,020	1,875	1,095	1,355	1,350	1,480	1,470
Corn oil	225	225	240	255	270	275	275	280	280
Totals	15,190	15,655	15,785	16,720	17,715	18,085	18,825	19,785	19,410
Palm oils[6]									
Coconut	2,363	2,325	2,420	2,435	2,360	2,500	2,275	2,150	2,350
Palm kernel	462	445	455	455	460	445	375	390	410
Palm	1,321	1,315	1,315	1,320	1,335	1,385	1,235	1,395	1,525
Babassu kernel[7]	59	66	50	57	60	73	57	75	75
Totals	4,205	4,151	4,240	4,267	4,215	4,403	3,942	4,010	4,360
Industrial oils[3]									
Linseed	1,100	1,075	1,140	1,175	1,155	1,215	1,055	920	1,105
Castor	320	300	320	395	370	365	335	405	435
Oiticica	19	28	6	19	13	20	2	10	8
Tung	133	126	125	153	160	140	158	132	157
Totals	1,572	1,529	1,591	1,742	1,698	1,740	1,550	1,467	1,705
Animal Fats									
Butter (fat content)	4,350	4,375	4,375	4,455	4,740	4,650	4,835	5,100	5,000
Lard[8]	4,060	4,085	4,005	4,165	4,380	4,235	4,360	4,420	4,480
Tallow and grease	3,869	3,745	4,085	4,295	4,190	4,330	4,430	4,570	4,620
Totals	12,279	12,205	12,465	12,915	13,310	13,215	13,625	14,090	14,100
Marine oils									
Whale	356	390	295	249	218	126	112	100	105
Sperm whale	137	130	149	165	170	161	164	150	150
Fish (including liver)	687	738	680	839	865	975	1,071	1,125	1,150
Totals	1,180	1,258	1,124	1,253	1,253	1,262	1,347	1,375	1,405
Estimated world totals	34,426	34,798	35,205	36,897	38,191	38,705	39,289	40,727	40,980

[1] Years indicated are those in which the predominant share of the given oil was produced from its related raw material. [2] Preliminary. [3] Estimates of U.S. oil production include actual oil produced plus the oil equivalent of exported oilseeds; estimates for other countries are based upon the production of various oilseeds times the estimated normal proportions crushed for oil. [4] Excludes sulfur oil. [5] 1960-63 average. [6] Estimated on the basis of exports and information available on consumption in the various producing areas. [7] Mill production only. [8] Rendered lard only in most countries.

Source: USDA, January 1969.

TABLE 7

World Net Exports of Oilseeds, Oils and Fats

(thousands of metric tons)

	1964	1965	1966	1967	1968
PRIMARILY FOR FOOD					
Liquid Vegetable					
Soybeans	6,281	6,901	7,497	8,118	8,746
Soybean oil	590	556	398	518	436
Total, as oil	1,720	1,798	1,747	1,979	2,010
Cottonseed	350	463	380	314	282
Cottonseed oil	325	332	197	126	142
Total, as oil	382	406	258	176	187
Groundnuts	1,439	1,309	1,493	1,474	1,552
Groundnut oil	349	373	414	391	431
Total, as oil	982	949	1,071	1,040	1,114
Sunflowerseed	307	250	350	490	495
Sunflower oil	227	300	592	881	861
Total, as oil	345	410	746	1,097	1,079
Rapeseed	304	539	640	650	759
Rapeseed oil	23	64	116	143	138
Total, as oil	142	274	366	396	434
Sesame	173	159	165	167	176
Sesame, as oil	81	75	78	78	83
Olive oil[1]	184	111	173	192	148
Totals: Seeds	8,854	9,621	10,525	11,213	12,010
Vegetable oils	1,698	1,736	1,890	2,251	2,156
Combined, as oil	3,836	4,023	4,439	4,958	5,055
Palm					
Copra	1,404	1,417	1,444	1,213	1,240
Coconut oil	419	392	460	388	449
Total, as oil	1,318	1,299	1,384	1,164	1,243
Palm kernels	664	663	625	376	424
Palm kernel oil	51	55	83	108	112
Total, as oil	363	367	377	285	311
Palm oil	557	553	631	496	650
Totals: Seeds	2,068	2,080	2,069	1,589	1,664
Vegetable oils	1,027	1,000	1,174	992	1,211
Combined, as oil	2,238	2,219	2,392	1,945	2,204

TABLE 7 (Cont'd.)
World Net Exports of Oilseeds, Oils and Fats

(thousands of metric tons)

	1964	1965	1966	1967	1968
Animal fats, edible					
Butter (82%)	526	489	509	553	543
Lard[2]	463	291	306	334	339
Total	989	780	815	887	882
Marine oils, edible					
Whale oil (Production)	226	198	115	104	96
Fish oils	389	455	511	655	716
Total	615	653	626	759	812
WORLD TOTALS, PRIMARILY FOR FOOD					
Oilseeds, actual weight	10,922	11,701	12,594	12,802	13,674
Vegetable oils	2,725	2,736	3,064	3,243	3,367
Animal and marine	1,604	1,433	1,441	1,646	1,694
Grand total, oil basis	7,678	7,675	8,272	8,549	8,953
PRIMARILY NON-FOOD					
Industrial Vegetable oils					
Linseed	615	558	720	541	547
Linseed oil	233	285	199	248	147
Total, as oil	449	481	451	437	338
Castor beans	136	111	172	174	149
Castor oil	141	161	103	101	168
Total, as oil	203	211	180	179	235
Tung oil	46	41	45	55	47
Totals: Seeds	751	669	892	715	696
Oils	420	487	347	404	362
Combined, as oil	698	733	676	671	620
Tallow and Greases[2]	1,413	1,251	1,246	1,402	1,393
Sperm oil (Production)	153	141	148	151	137
WORLD TOTALS, PRIMARILY NON-FOOD					
Oilseeds, actual weight	751	669	892	715	696
Vegetable oils	420	487	347	404	362
Animal and marine	1,566	1,392	1,394	1,553	1,530
Grand total, oil basis	2,264	2,125	2,070	2,224	2,150

TABLE 7 (Cont'd.)
World Net Exports of Oilseeds, Oils and Fats

(thousands of metric tons)

	1964	1965	1966	1967	1968
WORLD GRAND TOTALS					
Oilseed, actual weight	11,673	12,370	13,486	13,517	14,370
Vegetable oils	3,145	3,223	3,411	3,647	3,729
Animal and marine	3,170	2,825	2,835	3,199	3,224
Grand Totals, oil basis	9,942	9,800	10,342	10,773	11,103

[1] Including residue oil, partly inedible.
[2] Including negligible amounts of edible tallow.

Source: Courtesy of Oil World, Hamburg.

TABLE 8
World Net Exports of Oilseed Meals and Fish Meal

(thousands of metric tons)

	1965				1966			
	Seed[1]	Meal	Total	Prot.[2]	Seed[1]	Meal	Total	Prot.[2]
Oilseed meals								
Soybean	5,452	2,110	7,562	3,479	5,923	2,496	8,419	3,873
Cottonseed	319	1,194	1,513	620	262	1,252	1,514	621
Groundnut	733	1,427	2,160	1,123	836	1,497	2,333	1,213
Sunflowerseed	92	396	488	210	129	649	778	335
Rapeseed	307	74	381	137	365	132	497	179
Sesame	83	43	126	50	86	40	126	50
Copra	496	383	879	193	505	378	883	194
Palm kernel	345	100	445	80	325	123	448	81
Linseed	357	724	1,081	389	461	524	985	355
Unspecified[3]	190[4]	231	421	134	180[4]	196	376	115
Total	8,374	6,682	15,056	6,415	9,072	7,287	16,359	7,016
Fish Meal	— —	2,179	2,179	1,416	— —	2,332	2,332	1,516
GRAND TOTAL	8,374	8,861	17,235	7,831	9,072	9,619	18,691	8,532

	1967				1968			
	Seed[1]	Meal	Total	Prot.[2]	Seed[1]	Meal	Total	Prot.[2]
Oilseed meals								
Soybean	6,413	2,635	9,048	4,162	6,909	2,970	9,879	4,544
Cottonseed	217	1,228	1,445	592	195	1,161	1,356	556
Groundnut	825	1,398	2,223	1,208	869	1,516	2,385	1,240
Sunflowerseed	181	676	857	369	183	604	787	338
Rapeseed	370	95	465	167	433	118	551	198
Sesame	87	22	109	44	92	23	115	46
Copra	425	401	826	182	434	387	821	181
Palm kernel	196	157	353	64	220	148	368	66
Linseed	346	492	838	302	350	410	760	274
Unspecified[3]	185[4]	225	410	130	185[4]	267	452	144
Total	9,245	7,329	16,574	7,220	9,870	7,604	17,474	7,587
Fish Meal	— —	2,857	2,857	1,857	— —	3,409	3,409	2,216
GRAND TOTAL	9,245	10,186	19,431	9,077	9,870	11,013	20,883	9,803

[1] Oilseed meal equivalents of oilseed net exports or net export availabilities, respectively.
[2] Average raw protein content of oilcake/expeller/meal.
[3] Except castor bean. [4] Mainly safflowerseed

Source: Courtesy of Oil World, Hamburg.

TRENDS IN CANADIAN OILSEED CRUSHING

Canada's crushing industry processes four domestic oilseeds: flaxseed, soybeans, rapeseed and sunflowerseed. About two thirds of the processed soybeans are imported from the United States. According to the Dominion Bureau of Statistics there were 12 establishments processing oilseeds in Canada in 1965. In 1969 this number was reduced to 10 by the abandonment of two small flaxseed mills in Toronto and Montreal. Six of the remaining plants have enlarged their processing capacity within the past few years.

Total oilseed crushings increased by 15 per cent or 226 million pounds during the five-year period from 1964/65 to 1968/69, i.e., from 1,465 million pounds to 1,691 million pounds.

Flaxseed crushings declined by 28 per cent or 45 million pounds to 117 million pounds in 1968/69, and now account for only 7 per cent of the total oilseed volume. Linseed oil yields dropped from 35.4 per cent in 1967/68 to 35.1 per cent in 1968/69. Linseed meal yields rose from 61.4 per cent to 61.6 per cent during the same period.

Soybean crushings increased slightly by about 2.5 per cent or 31 million pounds from 1,172 million pounds in 1964/65 to 1,203 million pounds in 1968/69, and now account for 71 per cent of all oilseed crushings as compared with 80 per cent five years ago. Soybean oil yields increased from 16 per cent in 1967/68 to 17 per cent in 1968/69. Soybean meal yields declined slightly from 79.5 per cent to about 79.1 per cent.

Rapeseed crushings showed a striking increase of more than 200 per cent from 108 million pounds in 1964/65 to 347 million pounds in 1968/69, although rapeseed even now accounts for only slightly more than 20 per cent of all Canadian oilseed crushings. Rapeseed oil yields increased from 40.4 per cent in 1967/68 to 40.7 per cent in 1968/69. Rapeseed meal yields declined from 57.4 per cent to 46.6 per cent during the same period. While sunflowerseed crushings constitute a relatively minor part of the industry, they are important to the economy of southern Manitoba, where one plant at Altona crushes the local crop. The size of the crop and its quality are largely responsible for the fluctuations in total sunflowerseed crushings. The price of the seed to the farmer and the competitive position of sunflowerseed oil in the vegetable oil market are major factors affecting the seed and thus the domestic sunflower oil supply.

Total crushings of 24 million pounds in 1968/69 are similar to the volume of 23 million pounds reported in 1964/65, and amount to 1.4 per cent of the raw material input of all mills. Sunflowerseed oil yields declined from 41.2 per cent in 1967/68 to 39.2 per cent in 1968/69. The improvement in the varieties of sunflowerseed grown in Manitoba becomes evident when comparing these yields with the 34.3 per cent yield recorded in 1964/65. Sunflowerseed meal yields have increased from 35.4 per cent in 1967/68 to 38.3 per cent in 1968/69.

While total crushings increased by only 15 per cent in the course of the five-year period, total vegetable oil output rose by 25 per cent from 307 million pounds in 1964/65 to 385 million pounds in 1968/69. The edible oil part accounts for 344 million pounds of this total. It is interesting to compare this figure with the 422 million pounds of fully refined and deodorized vegetable oils processed by the Canadian edible oil refiners in 1968 (Table 73A).

The volume of linseed oil output declined from 56 million pounds to 41 million pounds during this period, soybean oil production remained virtually stationary, and the 204-million-pound output accounted for 53 per cent of the industry's oil production. Rapeseed oil, on the other hand, recorded a striking growth from 42 million pounds in 1964/65 to 141 million pounds in 1968/69. Rapeseed oil now accounts for nearly 37 per cent of the oil output of the oilseed mills. The growth of domestic rapeseed oil production to 141 million pounds begins to seriously challenge the supremacy of soybean oil. The volume of crude rapeseed oil production has reached 69 per cent of the Canadian soybean oil output.

Sunflowerseed oil output fluctuated greatly and has remained below the 10-million-pound level. It should be noted that in 1968 Canada also imported 40 million pounds of sunflowerseed oil.

Oilseed meal production rose only by about 11 per cent from 1,104 million pounds in 1964/65 to 1,230 million pounds in 1968/69. The major shift in Canadian oilseed crushings has been the increase in the utilization of rapeseed, which has a high oil content and, therefore, contributed mainly to the increased oil production, while having relatively less influence on the high-protein meal output. Generally, the trends in meal output reflect the changes in the usage of oilseeds by the crushers. Soybean meal retains its dominant position and the output of 953 million pounds accounts for 77.5 per cent of total oilseed meal production. Rapeseed meal has replaced linseed meal in the second place, and it accounts for 16 per cent of the volume as compared with 6.5 per cent for linseed meal. Sunflowerseed meal accounts for less than one per cent.

The total oilseed meal output becomes more meaningful when expressed on a protein basis as follows:

Linseed meal (34%)	:	24 million pounds
Soybean meal (45%)	:	429 million pounds
Rapeseed meal (36%)	:	71 million pounds
Sunflowerseed meal (40%)	:	4 million pounds
		528 million pounds

Soybean protein, thus, accounts for 81 per cent and rapeseed protein for 13 per cent of the domestic production of oilseed protein feeds. The increase in rapeseed crushings and the striking advance in rapeseed oil output are not matched by a similar growth in rapeseed meal output. This illustrates the limitations as well as the potential of rapeseed as a replacement for soybeans.

TABLE 9
CANADIAN CRUSHINGS OF VEGETABLE OILSEEDS AND PRODUCTION OF OIL AND MEAL

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(Millions of Pounds)			
Crushings					
Flaxseed	162	147	142	127	117
Soybeans	1,172	1,239	1,193	1,190	1,203
Rapeseed	108	187	248	258	347
Sunflowerseed	23	14	14	24	24
Total	1,465	1,587	1,597	1,599	1,691
Oil Production					
Flaxseed	56	51	50	45	41
Soybeans	201	205	202	190	204
Rapeseed	42	73	99	104	141
Sunflowerseed	7.9	4.8	5.6	9.9	9.4
Total	307	334	357	349	385
Meal Production:					
Flaxseed	102	90	87	78	72
Soybeans	930	983	949	945	953
Rapeseed	63	108	142	148	196
Sunflowerseed	8.6	5.2	5.4	8.5	9.2
Total	1,104	1,186	1,183	1,180	1,230

Source: DBS #32-006

TABLE 10
MONTHLY PRICES OF VEGETABLE OILS AND OILSEED MEALS[1]

(Crop Years 1967/68 and 1968/69)

Year and Month	Linseed Oil	Rapeseed Oil	Soybean Oil	Linseed Meal[2]	Rapeseed Meal	Soybean Meal
	(Cents per Pound)			(Dollars per Ton)		
1967/68						
August	14.78	10.07	11.87	117.20	66.95	106.00
September	14.55	9.57	11.78	117.80	68.90	108.60
October	13.78	9.17	11.42	118.00	63.43	107.80
November	14.55	8.93	11.13	118.00	63.83	101.40
December	14.44	8.95	11.20	118.00	63.95	102.20
January	14.44	8.89	11.06	118.40	65.27	104.20
February	14.22	8.92	11.45	118.40	65.95	104.60
March	13.89	9.09	11.35	118.40	65.43	103.80
April	13.00	8.69	10.86	118.80	65.05	104.80
May	14.55	8.68	10.60	119.00	64.08	104.80
June	14.11	8.52	9.72	119.00	63.32	110.60
July	14.33	8.17	9.30	119.00	61.33	112.20
Yearly Average	14.22	8.97	10.98	118.40	64.79	105.92
1968/69						
August	13.89	7.93	9.26	117.20	60.00	115.80
September	13.78	7.97	9.01	117.80	63.73	117.80
October	13.67	7.90	8.84	118.00	64.15	110.80
November	13.22	8.04	9.61	118.00	62.07	104.40
December	13.44	8.66	10.37	118.00	59.40	104.00
January	13.89	8.94	10.05	118.40	58.83	102.60
February	13.67	8.93	9.97	119.00	58.87	102.10
March	13.74	8.92	10.35	119.40	59.29	103.93
April	13.67	8.86	10.11	119.20	60.82	106.20
May	13.67	8.93	10.28	119.40	62.05	110.50
June	13.37	8.15	9.26	120.20	64.03	111.33
July	13.86	8.29	9.47	120.20	62.52	109.13
Yearly Average	13.66	8.46	9.72	118.73	61.31	108.22

[1] Average wholesale prices paid to crushers by processors and manufacturers.

[2] Average retail prices.

SOYBEANS, SOYBEAN OIL, SOYBEAN MEAL

Soybeans:

Canadian soybean acreage, concentrated overwhelmingly in three counties of south-western Ontario, has been rising gradually from an average of about 242,000 acres 10 years ago to 290,000 in 1967 and 295,000 in 1968. Despite the expectation that the lowering of the United States support price from $2.50 to $2.25 per bushel would adversely affect the prices received by Canadian farmers, acreage increased again in 1969 by 27,000 acres (9 per cent), to a record 322,000 acres.

While yields per acre were satisfactory in 1967: 27.9 bushels, and in 1968: 30.6 bushels, adverse weather reduced the yield drastically to an average of 23.6 bushels in 1969. Thus the total value of the 1967 soybean crop (average farm price: $2.69 per bushel) amounted to about $21.8 million. The preliminary estimate for the value of the 1968 crop is $22.7 million, and for the 1969 crop about $18 million. The 1969 Canadian crop is equivalent to about 80 million pounds of oil and 180,000 tons of soybean meal.

Soybean imports have been declining steadily from a high of 17.1 million bushels in 1965/66 to 12.5 million bushels in 1968/69 — i.e., by 27 per cent. The value of imported beans has dropped from a $50-million-level to $31 million during the calendar year 1968. Soybean exports, too, have been declining from a high of 3.6 million bushels in 1966/67 to 1.6 million bushels in 1967/68 and to 1.1 million bushels in 1968/69. Following the Kennedy Round negotiations Canadian soybean growers have lost a five-per-cent duty advantage in Britain, Canada's major exports market. Trade sources forecast a further decline of this market.

While soybean imports and exports have declined, the total domestic crushing volume has been kept relatively constant at the 20-million-bushel level. Consequently it can be concluded that the Canadian crushing industry has expanded the utilization of domestic beans. A calculation shows that domestic soybeans have accounted for about 17 per cent of the total crushings in 1964/65 and that their share has risen to about 36 per cent in 1968/69. The domestic processors are purchasing Canadian soybeans for which an overseas market has been lost. Domestic soybean processors continued to use more than 80 per cent of their crushing capacity in 1968/69.

United States Situation

The United States crop reached a record of 1,094 million bushels in 1969, and is regarded by U.S.D.A. only slightly above the prospective disappearance, which will top one billion bushels for the first time. Continued strong demand for soybean products in the United States and abroad has maintained relatively high price levels for soybean oil and meal during the second half of 1969. U.S.D.A. reports processing margins to be quite favorable at about 61 cents per bushel in October 1969, based on spot prices, compared with 29 cents in October 1968. Domestic soybean crushings in the United States are expected to increase by 50 million bushels from 606 million bushels in 1968/69. Soybean exports are also expected to increase by 50 million bushels above the 1968/69 record of 287 million bushels as a result of lower U.S. bean prices, reduced availabilities of fish meal and of sunflowerseed oil. More than 75 per cent of the United States' exports of 287 million bushels of soybeans were destined for Western Europe and Japan.

Soybean Oil

Total Canadian production and domestic disappearance have remained remarkably constant around the 200-million-pound level for the past five crop years. As mentioned above, domestic production of soybean oil is based to a decreasing extent on imported soybeans.

During 1967/68 average prices for crude soybean oil dropped gradually from 11.87 cents per pound to 9.30 cents and averaged 10.98 cents. During 1968/69 prices were generally lower. They ranged between 8.84 and 10.35 cents per pound, averaging at 9.72 cents for the season.

Soybean oil imports, all from the United States, have shown a declining trend from 34.5 million pounds in 1964 to 22.3 million pounds in 1968. Judging by the average price in 1967 and 1968, it must be assumed that most of this oil was crude and not refined (Table 15).

While on a calendar year basis soybean oil exports seem to have fluctuated strongly between 25 million pounds in 1964 and 43 million pounds in 1967, the crop year reports indicate a more constant pattern of 30-35 million pounds. Virtually all of this oil is exported to Britain, where Canada possesses a limited market for crude soybean oil.

Soybean oil production in the United States has increased during the 1960's from 4.4 billion pounds to 6.5 billion pounds, as compared with a much smaller Canadian growth from 174 million pounds to 204 million pounds. While the Canadian figures reflect a modest increase in domestic consumption, the United States home consumption has risen more steeply from 3.3 billion pounds in 1960/61 to an estimated 6 billion in 1969/70. United States soybean oil exports have ranged around the one-billion-pound level, decreasing, however, at a rate of about 100 million pounds annually during the past two years to 0.9 billion pounds shipped in 1968/69. About 85 per cent of this oil is exported under Public Law 480.

Soybean Meal

Soybean meal production, too, has remained at the same level for the past five years, amounting to 476,300 tons in 1968/69. Total soybean meal imports were 246,800 tons in 1968/69 — about five per cent below the level of 260,800 tons reached in 1964/65. Two thirds of all soybean meal imports enter Canada at Quebec and Ontario border points and are presumably largely consumed in these areas. It seems likely that of the total domestic disappearance of 588,500 tons in 1968/69, at least 450,000 tons were consumed in Ontario and Quebec. Western Canadian demand for soybean meal is met by imports ranging around 80,000 tons annually and by the output of one relatively small mill in Manitoba. Average wholesale prices paid to crushers for soybean meal were $105.92 in 1967/68 and $108.22 per ton in 1968/69. Comparable values reported for rapeseed meal were $64.79 and $61.31 during similar periods. Assuming average protein contents of 45 per cent for soybean meal and 36 per cent for rapeseed meal, the former fetched $2.40 and the latter $1.70 per protein unit. Trade sources estimated the prices per protein unit to be closer together.

The most significant development in the soybean meal area is the loss of a large part of the soybean meal market in Britain, resulting from the partial elimination of the preferential treatment following the Kennedy Round negotiations. On a crop year basis Canada's exports declined by more than 50 per cent from 267,100 tons in 1964/65 to 131,200 tons in 1968/69. Soybean meal exports reported on a calendar year basis do not yet reflect this drastic decline to the same extent (Table 18). The loss of export markets has forced the soybean crushing industry to dispose of more meal domestically.

On the other hand, during the first half of the 1969/70 crop year we have witnessed a reversal of the demand situation. The demand for soybean oil is stronger than the demand for the meal. A substantial increase in total soybean crushings can be expected.

TABLE 11
CANADIAN SUPPLY AND DISPOSITION OF SOYBEANS, SOYBEAN OIL AND SOYBEAN MEAL

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(millions of bushels)			
Soybeans					
Stocks, starting[1]	1.5	1.1	1.9	1.7	1.7
Production	7.0	8.0	9.0	8.1	9.0
Imports	16.5	17.1	16.3	13.3	12.5
Supply	25.0	26.2	27.2	23.1	23.2
Domestic crushings	19.5	20.7	19.9	19.8	20.1
Exports	3.2	2.2	3.6	1.6	1.1
Stocks, July 31	1.1	1.9	1.7	1.7	1.6
		(millions of pounds)			
Soybean Oil					
Stocks, starting[1]	9.8	11.0	13.5	8.2	7.9
Domestic production	201.1	205.3	201.5	199.0	204.0
Imports	33.7	23.7	20.4	20.9	25.7
Supply	244.6	240.0	235.4	228.1	237.6
Exports	33.2	35.3	34.6	30.3	32.1
Stocks, July 31	11.0	13.5	8.2	7.9	7.9
Apparent domestic disappearance	200.4	191.2	192.6	189.9	197.6
		(thousands of tons)			
Soybean Meal					
Stocks, starting[1]	4.3	11.5	8.8	0.8	9.3
Domestic production	464.9	491.4	474.4	472.3	476.3
Imports	260.8	225.4	228.4	237.1	246.8
Supply	730.0	728.3	711.6	710.2	732.4
Exports	267.1	242.5	170.4	169.3	131.2
Stocks, July 31	11.5	8.8	0.8	9.3	12.7
Apparent domestic disappearance	451.4	477.0	540.4	531.6	588.5

[1] Stocks held at crushing plants only.

Source: Based on DBS Data.

TABLE 12
CANADIAN SOYBEAN PRICES[1]

(Crop Year)

(cents and eighths per bushel)

Prices[1]	1964/65	1965/66	1966/67	1967/68	1968/69
August	276	283/6	339/2	297/3	270/4
September	298/2	272/7	325/3	293	261/5
October	303/6	273/4	310/4	287/3	248/7
November	312/7	264/1	305/5	276/6	254/7
December	318/3	283/3	303	271/5	258/1
January	324/1	298/5	296/6	273/6	260/4
February	328/6	302/7	295/1	276/5	261/2
March	322/1	297/4	300/4	276/3	260/0
April	320/1	309/5	298/4	272/3	264/7
May	302/5	321/7	300/4	272/1	267/2
June	312/2	346/6	304/5	269/1	264/3
July	304/3	362/1	300/2	269/5	270/3
Yearly average	310/4	301/2	306/4	278/3	261/7

[1] Buying prices, carlots f.o.b. Chatham

Source: DBS No. 22-001

TABLE 13
CANADIAN IMPORTS OF SOYBEANS

(tons)

Country of Origin	1964	1965	1966	1967	1968
Hong Kong	5	7	6	12	6
United States	548,326	476,255	475,213	483,282	329,386
Total (tons)	548,331	476,262	475,219	483,294	329,392
Total (millions of bushels)	18.3	15.9	15.8	16.1	11.0
Total Value (thousands of $)	52,899	46,327	52,438	48,063	31,071
Average Price ($ per bushels)	2.89	2.92	3.31	2.98	2.83

Source: DBS, Trade of Canada

TABLE 14
CANADIAN EXPORTS OF SOYBEANS

(tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	56,547	82,521	94,006	66,936	45,254
Denmark	– –	3,699	22	22	– –
Germany, West	1,120	4,535	2,285	4,393	1,304
Sweden	1	33	44	247	308
Switzerland	33	45	– –	– –	56
Rep. of South Africa	– –	198	279	– –	– –
United States	– –	1	13	4	1
Netherlands	– –	– –	1,623	22	154
France	– –	– –	– –	22	– –
Total (tons)	57,702	91,032	98,272	71,625	46,792
Total (millions of bushels)	1.9	3.0	3.3	2.4	1.6
Total Value (thousands of $)	5,767	9,954	10,906	7,940	4,765
Average Price ($ per bushel)	3.03	3.32	3.31	3.31	2.98

Source: DBS, Trade of Canada

TABLE 15
CANADIAN IMPORTS OF SOYBEAN OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Germany, West	– –	– –	101	– –	– –
United States	34,505	29,946	24,241	23,142	22,315
Total	34,505	29,946	24,342	23,142	22,315
Total Value (thousands of $)	3,822	4,104	3,398	2,737	2,289
Average price (cents per pound)	11.1	13.7	14.0	11.8	10.3

Source: DBS, Trade of Canada

TABLE 16
CANADIAN EXPORTS OF SOYBEAN OIL

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	25,016	33,278	29,191	42,929	31,369
Netherlands	– –	1,447	– –	– –	– –
Peru	– –	2	3	– –	1
Total	25,016	34,727	29,194	42,929	31,370
Total Value (thousands of $)	3,047	4,704	3,728	4,884	2,728
Average price (cents per pound)	12.2	13.5	12.8	11.4	8.7

Source: DBS, Trade of Canada

TABLE 17
IMPORTS OF SOYBEAN MEAL BY PROVINCE

(Calendar Year)

	1964		1965		1966		1967		1968	
	Tons	Thousands of Dollars	Tons	Thousands of Dollars	Tons	Thousands of Dollars	Tons	Thousands of Dollars	Tons	Thousands of Dollars
Nfld.	95	9	30	2	70	8	171	17	–	–
N.S.	160	14	175	14	1,124	109	–	–	40	3
P.E.I.	150	15	215	19	141	14	–	–	–	–
N.B.	935	72	870	73	685	69	445	39	1,802	169
Que.	58,220	4,520	80,185	6,568	57,730	5,540	59,026	5,388	63,511	6,474
Ont.	112,910	8,711	114,800	9,515	83,049	7,992	77,899	7,018	95,546	8,832
Man.	29,530	2,388	30,680	2,584	35,693	3,326	40,214	3,612	33,500	3,053
Sask.	375	32	640	58	4,000	368	415	38	899	77
Alta.	5,500	463	6,145	533	9,911	953	11,456	1,039	13,163	1,217
B.C.	15,040	1,220	15,250	1,350	22,432	2,122	30,856	2,766	29,218	2,807
TOTAL	222,915	17,444	248,990	20,716	214,835	20,500	220,482	19,867	237,680	22,633

Source: DBS.

TABLE 18
CANADIAN EXPORTS OF SOYBEAN MEAL

(tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	216,688	247,747	210,714	170,878	159,126
Australia	– –	6,391	442	– –	– –
Barbados	90	60	240	104	– –
Leew-Wind Is.	– –	2	16	– –	2
Trinidad-Tobago	15	106	70	60	– –
Cuba	12,493	1,255	328	– –	– –
United States	43	196	– –	17	53
Guyana	1	– –	– –	– –	– –
Sweden	– –	– –	– –	– –	22
Total	229,329	255,756	211,810	171,059	159,203
Total Value (Thousands of $)	21,075	24,270	20,267	16,738	15,672
Average Price ($ per ton)	91.8	94.8	95.6	97.8	98.4

Source: DBS, Trade of Canada

TABLE 19
CANADIAN IMPORTS OF MISCELLANEOUS OILSEED CAKE AND MEALS

(tons)

	1964	1965	1966	1967	1968
Cottonseed meal	2,917	4,420	1,873	406	785
Oilseed cake and meal (n.e.s.)	50	73	140	24	33
Total	2,967	4,493	2,013	430	818
Total value (thousands $)	235	358	176	37	70
Average price ($ per ton)	79.2	79.6	87.4	86.0	85.5

Source: DBS, Trade of Canada

TABLE 20
CANADIAN EXPORTS OF OILSEED CAKES AND MEALS (NES)

(Short Tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	1,114	3,539	2,734	–	1,704
Japan	–	–	–	–	–
Guyana	2	13	–	–	51
Trinidad-Tobago	93	159	–	15	31
United States	20	13	26	–	47
Leew.-Wind. Is.	1	37	–	27	85
Denmark	–	33	–	–	–
Barbados	–	5	–	8	138
Neth.-Antilles	–	–	–	–	5
Total	1,230	3,799	2,760	50	2,061
Total Value (thousands of $)	74	318	137	4	135
Average Price ($ per ton)	60.1	83.7	49.6	80.0	65.5

Source: DBS Trade of Canada.

RAPESEED, RAPESEED OIL, RAPESEED MEAL

The current rapeseed situation in Canada is dominated by the impact of the extraordinary increase in seeded acreage by 91 per cent from 1,052,000 acres in 1968 to 2,012,000 acres in 1969. Total production is expected to rise from 19.4 million bushels in 1968 to a record of 36.7 million bushels (920,000 short tons) in 1969.

The total supply can be estimated as follows:

Stock, July 31, 1969	4.9 mill. bu.
Production	36.7 mill. bu.
Total supply	41.6 mill. bu.
Minus dockage, etc.	5.0 mill. bu.
Total available supply	36.6 mill. bu.

The Rapeseed Association of Canada estimates that exports to Asia will amount to 14 million bushels and to Britain and Europe to 6 million bushels, a total of 20 million bushels during the 1969/70 crop year.

Projected Disposition	
Exports	20 mill. bu.
Domestic crushings	7.5 mill. bu.
Total	27.5 mill. bu.
Carry-over, July 31, 1970	9.1 mill. bu.

Rapeseed

All three Prairie Provinces increased their rapeseed acreages to record levels in 1969 after a decline in 1968. Wheat marketing problems prompted many farmers to switch wheat acreage to oilseeds, and particularly to rapeseed. This trend was most pronounced in Saskatchewan, which led the other two provinces with 1 million acres and a 19.2-million-bushel yield – more than half of the total crop. As usual rapeseed cultivation was concentrated in the north-central areas, but a trend to grow rapeseed on summerfallow in more southerly areas is expected to become apparent. Alberta grew a total of 816,000 acres and Manitoba 196,000 acres in 1969.

The Canadian Agricultural Outlook Conference recommended that the rapeseed acreage should not exceed 2.2 million acres in 1970 because a larger crop combined with a return to more normal supply conditions of European rapeseed and sunflowerseed would be expected to result in a sharp price decline and marketing difficulties for Canadian rapeseed. Officials of the Rapeseed Association of Canada are also concerned about the pressure to increase the acreage in 1970 to a level where the farmer would be saddled with a burdensome carry-over.

The tight supply situation prevailing during the first half of the 1969/70 crop year was entirely unexpected. It resulted from the sudden absence of large supplies of Soviet and East European sunflowerseed oil on the world market. The reduction in fish oil and meal production in Peru further aggravated the supply.

The following crop results have been reported for major European rapeseed producing areas:

	1968	1969
	(Thousand Short Tons)	
France	494	564
West Germany	187	174
Sweden	262	203
East Germany	300	275
Poland	770	748
Czechoslovakia	90	N/A

The 1969 crop data are preliminary estimates, especially for the Eastern European countries. It is believed that the adverse weather conditions which prevailed early in 1969 will force a drastic downward revision of the Eastern European estimates.

Average rapeseed prices, for No. 1 Canada Rapeseed, in store Vancouver, have ranged from $2.66 to $2.87 during the years 1964/67. The crop year 1967/68 witnessed a decline to $2.27, which meant that the price to the farmer dropped below $2.00 per bushel. The carry-over reached the 10 million bushel level on July 31, 1968. As a result farmers reduced the acreage by 38 per cent from 1.6 million in 1967 to 1.1 million in 1968. The average price dropped to $2.22 in 1968/69. However, the difficulties encountered in the sale of wheat, led to the sharp rise in rapeseed production in 1969, as reported above. Prices have climbed steeply, and returns to the farmer are estimated to range around $2.50 during the first half of the 1969/70 crop year.

Most of the rapeseed grown in Western Canada continues to be of the Polish type, Brassica campestris, while only a small proportion is of the Argentine type, Brassica napus. Federal Grain Limited, Winnipeg, estimates that the share of "Echo," a Polish variety, has grown substantially in 1969. "Target," a relatively new Argentine variety, is also increasing.

Rapeseed Varieties Seeded in 1969
(Per Cent)

Echo	52.8	Target	11.9
Arlo	17.2	Tanka	2.6
Polish	13.9	Other	1.6

The cultivation of the Polish varieties is encouraged because of their shorter growing period compared with the later maturing Argentine varieties. Research on the development of new varieties is centered in Saskatoon, Winnipeg and Edmonton, and plant breeders are making headway with varieties which have properties considered desirable by the users of rapeseed meal and oil.

Feeding results with meal derived from a B. napus variety called Bronowski, have shown this meal to be equal or superior to soybean meal used in the same test series. This variety does not contain any thioglucosides, the precursors of the goitrogenic substances liberated in rapeseed meal under certain conditions. So far this new variety has not been developed to a stage where it can be released for commercial growing.

Other breeding work is in progress with the aim of reducing the hull content and increasing the protein content. The plant breeders expect that commercial varieties combining these new features will be available in about five years.

Although relatively small quantities of fully refined rapeseed oil have been exported to Australia within the past two years, the bulk of Canadian exports remains confined to rapeseed for crushing. Total seed exports have been fairly constant at the 13-14-million-bushel level (350,000 short tons) since 1965.

With total seed exports of 362,262 tons in 1968, Canada maintained her leadership among exporting nations, accounting for an estimated 43 per cent of the world's total net exports of 835,000 short tons. While European countries — particularly Italy, The Netherlands and West Germany — nearly disappeared as Canadian rapeseed customers by 1968 (Table 24), Japan strengthened her position as Canada's major market. In 1968 a total of nearly 278,000 tons — 77 per cent of our exports — were sent to Japan. Taiwan became the second most important customer in 1968, purchasing 52,306 tons. The total value of Canadian rapeseed exports dropped from a record $41 million in 1967 to $32 million in 1968, mainly as a result of the 20 per cent decline in seed prices.

Rapeseed Utilization

The steady growth of the volume of domestic rapeseed crushings is the best gauge for the acceptability of rapeseed products by Canadian edible oil refiners and feed manufacturers. Total crushings have increased from 2.2 million bushels to 7.0 million annually during the five-year period 1964/69. Crushings run currently at the rate of 7.5 million bushels and a further substantial growth is anticipated. Crushing margins of soybean processors are major factors influencing the growth of rapeseed utilization. While margins for soybean crushing were claimed to have been very narrow during 1968/69, they were unusually favourable during the first part of 1969/70. Vancouver cash prices for rapeseed rose to 40 to 50 per cent per bushel above the Chicago soybean prices in fall 1969, thus reducing the margin for rapeseed processors.

The Department of Industry, Trade and Commerce has been financing an extensive research and development program, the Rapeseed Utilization Assistance Program, entering now its second year of operation. Studies are under way in the following areas:

1) rapeseed processing technology,
2) rapeseed meal utilization,
3) rapeseed oil utilization.

The Department is carrying out the Program in co-operation with the Rapeseed Association of Canada, whose Research Committee is in charge of the administration. All Canadian rapeseed crushers and edible oil refiners, as well as some feed manufacturers, are collaborating in these efforts. In 1968/69 nine research contracts were let to scientists working in six Canadian universities, and the number of contracts has nearly doubled in 1969/70. The results of these investigations are made available to all participating industries on a confidential basis and will also be published.

Rapeseed Oil

As shown in the accompanying graph, rapeseed oil production in Canada has been passing through a phase of rapid growth during the past five years and is now challenging the dominant role of soybean oil among the vegetable oils. Production reached the 141-million-pound level in 1968/69. On a fully refined basis, Canadian refiners produced — and this figure can be assumed to be nearly equivalent to consumption — 117 million pounds of rapeseed oil in 1968, i.e., 27.7 per cent of the refined vegetable oil production or 21 per cent of total refined fats and oils production.

It is interesting to compare the utilization of rapeseed and soybean oils, as shown in Table 73A for 1968:

	Rapeseed Oil	Soybean Oil
	(millions of pounds)	
Margarine Oil	33	51
Shortening Oil	46	70
Salad Oil	38	25

Some margarine brands are made 100 per cent from rapeseed oil. The spectacular growth in salad oils is due to the extensive use of rapeseed oil in dressings.

Only a few brands of retail salad oils list rapeseed oil as either the only or major ingredient. In both margarine and shortening manufacture the share of rapeseed oil amounted to about 65 per cent of the soybean oil used in 1968. Rapeseed oil used in these products is all hydrogenated and can be regarded as virtually interchangeable with soybean oil. Oil and processing costs are the main factors influencing the extent of rapeseed oil consumption in these products. In August 1969 the total production of refined rapeseed oil in all three sectors for the first time exceeded the output of refined soybean oil.

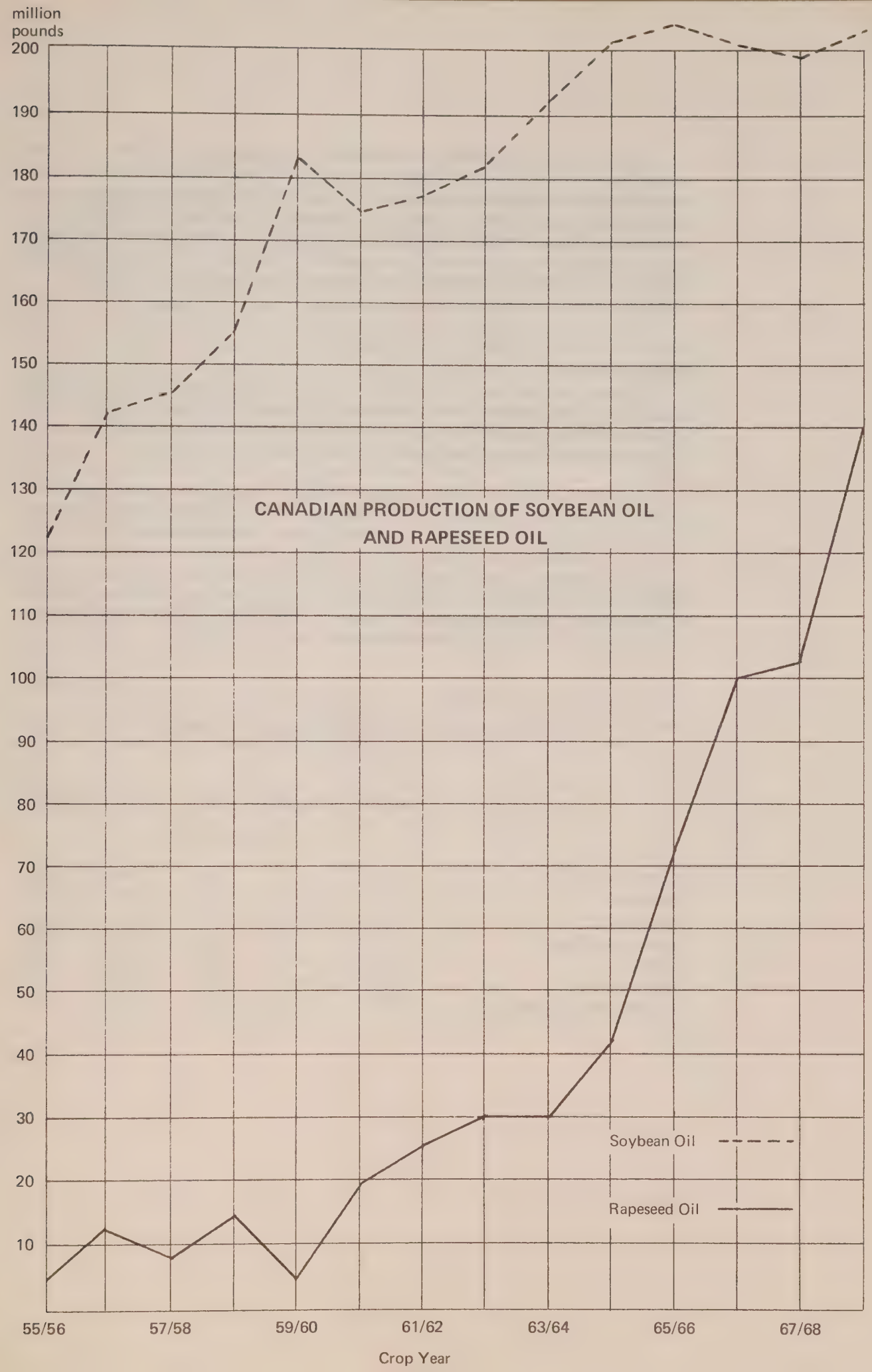

million pounds
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
CANADIAN PRODUCTION OF SOYBEAN OIL AND RAPESEED OIL
Soybean Oil
Rapeseed Oil
55/56
57/58
59/60
61/62
63/64
65/66
67/68
Crop Year

Table 10 lists f.o.b. crushing plant prices for crude rapeseed and soybean oils. Crude rapeseed oil has to compete with soybean oil mainly in the Ontario and Montreal markets, so that the rapeseed crushers have to absorb the higher freight rate for their product for Eastern Canadian deliveries. Rapeseed oil quotations in Montreal and Toronto fluctuate between 0.25 and 1 cent per pound below soybean oil, the remainder of the spread between the two oils being the shipping costs. The fact that the average spread was reduced from 2 cents in 1967/68 to 1.3 cents in 1968/69 can probably be attributed mainly to a lowering of the freight rate.

Rapeseed Meal

Rapeseed meal production amounted to only 32,500 tons in 1964/65. In 1967/68 domestic output had grown to 74,000 tons and in 1968/69 to 98,000 tons. As discussed under high-protein feed supplies (see Table 5), rapeseed meal continues to play a distinctly secondary role compared with soybean meal, important though it is to the economics of the rapeseed industry.

Rapeseed meal is all consumed domestically at the present time. According to trade sources, a major part is shipped from Western Canada to Eastern Canadian, including Maritime, markets. The freight costs for shipment of rapeseed meal to Eastern markets has had an adverse influence on the average return to the crusher, as illustrated in Table 10. Assuming a 36-per-cent protein content, crushers received an f.o.b. plant price of $1.70 per protein unit in 1968/69. This compares with a return of $2.40 (on a 45-per-cent average protein content basis) per protein unit to soybean crushers. It appears that the reported soybean meal prices are somewhat high and not representative for total production.

TABLE 21
CANADIAN SUPPLY AND DISPOSITION OF RAPESEED

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(thousands of bushels)			
Stocks, starting	881	1,514	3,366	5,789	9,923
Production	13,230	22,600	25,800	24,700	19,400
Total supply	14,111	24,114	29,166	30,489	29,323
Domestic crushings	2,160	3,746	4,963	5,159	6,934
Exports	9,276	13,632	13,818	12,309	14,311
Stocks, July 31	1,514	3,366	5,789	9,923	4,920
Dockage, seed, shrinkage, etc.	1,161	3,370	4,596	3,098	3,158

TRENDS OF SUMMERFALLOWING

The proportion of each crop, included in the report of the Dominion Bureau of Statistics, sown on summerfallowed land in the Prairie Provinces in 1968 increased compared with the previous year. In the case of rapeseed the proportion was actually higher than the five-year 1962-66 average.

For both flaxseed and rapeseed the previous trend of growing an increasing proportion of these crops on stubble was reversed. It is expected that the 1969 crop will show a continuation of this trend, since these oilseed crops are now replacing wheat acreage.

The percentage of rapeseed grown on summerfallow in 1968 increased to 61 from 56 during the preceding three years. The percentage of flaxseed grown on summerfallow increased from 27 in 1967 to 36 in 1968.

Agricultural practices in Manitoba differ from those of Saskatchewan and Alberta. In Manitoba, which accounted for about 55 per cent of the flaxseed acreage of the Prairies in 1968, only 15 per cent of the flaxseed was grown on summerfallow, while the proportion in Saskatchewan amounted to 56 per cent and in Alberta to 68 per cent.

Manitoba has the smallest rapeseed acreage of the three Prairie Provinces, and the proportion grown on summerfallow was only 31 per cent in 1968, against 71 per cent in Saskatchewan and 56 per cent in Alberta.

Rapeseed Yields

In 1968 the average yield per acre was 20.2 bushels on summerfallow and 13.9 bushels for rapeseed grown on stubble for all Prairie Provinces. Saskatchewan recorded the highest average yield per seeded acre of 22.1 bushels on summerfallow and 15.5 bushels on stubble.

Flaxseed Yields

Flaxseed yields for all Prairie Provinces were 13.5 bushels on summerfallow and 10.9 bushels on stubble in 1968. The highest average yields per seeded acre were recorded in Alberta with 16 bushels on summerfallow and 13.2 bushels on stubble.

TABLE 22
RAPESEED AND FLAXSEED: SUMMERFALLOW AND STUBBLE CULTIVATION

Prairie Provinces

	Rapeseed			Flaxseed		
	Summer-fallow	Stubble	Total	Summer-fallow	Stubble	Total
Seeded Area						
Thousand Acres						
1962-66 Average	549	372	921	705	1,113	1,818
1967	911	209	1,620	269	729	998
1968	644	408	1,052	541	961	1,502
Distribution						
Per Cent						
1962-66 Average	60	40	100	39	61	100
1967	56	44	100	27	73	100
1968	61	39	100	36	64	100
Average Yield Per						
Seeded Acre (bushels)						
1962-66 Average	19.3	12.3	16.5	13.5	10.2	11.5
1967	18.4	11.1	15.2	11.9	8.0	9.0
1968	20.2	13.9	17.8	13.5	10.9	11.8
Production						
Million Bushels						
1962-66 Average	10.61	4.56	15.17	9.5	11.4	20.9
1967	16.80	7.90	24.70	3.2	5.8	9.0
1968	13.03	5.67	18.70	7.3	10.5	17.8

Source: DBS, Field Crop Reporting Series, #22-002.

TABLE 23
CANADIAN RAPESEED PRICES[1]

(Crop Year)

(cents and eighths per bushel)

	1964/65	1965/66	1966/67	1967/68	1968/69
August	254/4	232	289/5	258	209/1
September	259/3	230/3	274/6	238	214/6
October	262/3	244	265/5	231/4	208/3
November	286/5	271/2	271	232/1	215/4
December	308/6	260	285/6	235/7	227/2
January	316/5	295	280/7	233/1	234/7
February	317/5	287/5	284/3	231/2	244/5
March	310	265	294/4	224/2	231/2
April	304/6	269/2	280/5	212/6	226/6
May	287	270/4	273/3	213/2	219
June	272/6	284/2	269/3	210/3	215
July	262/1	282/6	271/1	201/2	217/6
Yearly average	287	266	278/3	226/6	222

[1] Winnipeg Grain Exchange No. 1 Canada Rapeseed, basis in store Vancouver.

Source: DBS No. 22-001

TABLE 24

CANADIAN EXPORTS OF RAPESEED

(Tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	2,296	8,922	4,055	1,140	–
Belgium-Luxemburg	–	1,696	8,369	–	–
Germany, West	232	22,646	21,710	224	253
Italy	3,265	48,126	60,288	87,127	8,168
Netherlands	9,342	22,429	40,005	17,483	6,753
Spain	1,003	152	28	120	40
Czechoslovakia	–	15,184	–	–	–
Poland	–	9,921	–	–	–
Pakistan	–	22,462	19,841	–	–
Japan	62,492	114,556	194,498	234,546	277,903
United States	3,133	119	141	248	2,674
Morocco	–	–	–	14,198	13,759
Taiwan	4,235	–	–	15,955	52,306
Korea, South	–	–	–	–	405
Finland	2,246	–	–	–	–
India	2,800	–	–	–	–
Total Weight (tons)	91,041	266,213	348,936	371,040	362,262
Total Weight (thousands of bushels	3,642	10,649	13,957	14,841	14,490
Total Value (thousands of $)	10,152	30,900	38,480	40,868	31,908
Average Price ($ per bushels)	2.79	2.90	2.76	2.75	2.20

Source: DBS, Trade of Canada

TABLE 25
CANADIAN EXPORTS OF RAPESEED OIL

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United States	391	5	1	1	1
Total	391	5	1	1	1
Value (thousands of $)	45	1	1	1	1
Average price, (cents per pound):	11.5	20.0			

[1] In 1966 the previous class for rapeseed oil #393-56 was dropped, and the oil is now included in the basket class #393-99, Vegetable Oils and Fats, n.e.s.

Source: DBS, Trade of Canada

QUALITY OF 1968 RAPESEED CROP

The oil content of the 1968 rapeseed crop averaged 46 per cent, the highest level since the grain Research Laboratory instituted the survey in 1956. By way of contrast, the protein content of the oil-free meal was 39 per cent, the lowest value ever recorded in these annual surveys. Contamination of rapeseed with small inseparable weed seeds was a problem again in 1968, and this, together with the effects of poor harvesting weather, was expected to result in significantly larger amounts of seed entering the lower grades.

The low protein content of the meal of the 1968 crop indicates an inverse correlation between oil content and protein content. Protein levels were lowest for Alberta-grown seed and highest for Saskatchewan-grown seed.

Almost 70 per cent of the rapeseed survey samples had an oil content level of 45 per cent or more.

Preliminary reports of the 1969 crop indicate a lower oil content. Favourable weather during the late summer permitted the 1969 crop to mature well, and the edible oil refiners report very good refining properties for new crop oil.

TABLE 26

QUALITY DATA FOR WESTERN CANADIAN RAPESEED,
SURVEY SAMPLES OF 1967 AND 1968 CROPS

	1967 Survey		1968 Survey		
	Oil Content	Protein Content	Oil Content	Protein Content	No. of Samples
Western Canada					
No. 1 CRS	44.0	41.3	46.1	39.3	198
No. 2 CRS	43.9	42.9	45.8	38.4	47
No. 3 CRS	43.1	41.0	46.1	37.9	17
All grades	44.0	41.3	46.0	39.0	262
All Grades by Province					
Manitoba	45.1	41.4	46.2	39.3	31
Saskatchewan	43.3	41.9	45.7	40.2	110
Alberta	44.3	40.6	46.3	37.9	121

NOTE: The oil content of the seed and the protein content of the oil-free meal are reported on a moisture-free basis.

Source: Grain Research Laboratory, Board of Grain Commissioners, Winnipeg

THE CANADIAN SUNFLOWERSEED SITUATION

Sunflowerseed acreage decreased in 1968 to 40,000 from 45,800 acres in 1967. The drop in the farm price from 6 cents to 4.5 cents per pound reduced the incentive to grow this crop. In 1969 the seeded acreage rose to 48,000 acres, largely as a result of the wheat marketing difficulties. Latest DBS data show that no sunflowerseed was grown in Saskatchewan or Alberta in 1969. The indicated yield in 1969 at 708 pounds per acre is 14 per cent higher than the 1968 average of 619 pounds. Total production is estimated at 34.0 million pounds – 37 per cent above the 1968 crop of 24.8 million pounds, and 16 per cent larger than the ten-year average of 29.4 million pounds. According to Mr. P. Bergen of Coop Vegetable Oils Limited, Altona, the percentage distribution of various sunflowerseed varieties was as follows in 1969:

Peredovik	: 34%
Valley	: 2%
Krasnodarets	: 41%
Armavirec	: 15%
Commander	: 8%

The high-oil Russian varieties account for 90 per cent of the Canadian crop. Krasnodarets has replaced Peredovik as the leading variety.

Domestic sunflowerseed crushings have remained at the 24-million-pound level for the past two crop years, producing between 9 and 10 million pounds of sunflowerseed oil. The influx of considerable quantities of sunflowerseed oil from Eastern Europe during the crop years 1967/69 seriously affected the economic structure of the Canadian sunflowerseed industry. When sunflowerseed oil prices rose again above soybean oil prices in Europe during the second half of 1969, the economic situation of the Canadian producers began to improve.

Sunflowerseed oil imports (Table 29), rose from 34 million pounds in 1967 to 40 million pounds in 1968, and imports continued at the same rate during the first part of 1969. More than 73 per cent of the Canadian production of refined sunflowerseed oil was used in the manufacture of salad oil (Table 73A), in 1968 – about 17 per cent in shortening and 10 per cent in margarine. It seems that the imported sunflowerseed oil replaced cottonseed oil, particularly in salad oils but also in shortening formulations. In 1968 sunflowerseed oil accounted for an unprecedented 11.5 per cent of the total Canadian refined vegetable oil output.

The Soviet Union, Romania and Bulgaria are the main Eastern European sunflowerseed producers, and together with Argentina account for 90 per cent of the world production, which in 1968 was estimated at about 10.2 million short tons. Preliminary reports indicate that Eastern European total output in 1969 was not very much below the 1968 level. Nevertheless, only limited quantities of oil and seed have been exported, partly through direct transactions with major European customers. So far it is not known under what conditions the Eastern European countries will re-enter the world market.

Canadian sunflowerseed exports have declined drastically from a record 9,400 tons in 1966 to 1,200 tons in 1968. Only a fraction of the United States market now remains as an outlet for birdseed and confectionery varieties. Increased domestic production of sunflowerseed in the United States will in all likelihood prevent the recovery of this export market.

Total Canadian sunflowerseed oil consumption is currently equivalent to about 165,000 acres of seed. If Canadian processors could market sunflowerseed oil at a price competitive with soybean oil and other oils of a similar price range, the acreage could be expanded to this level and beyond.

TABLE 27
CANADIAN SUNFLOWERSEED: ACREAGE, PRODUCTION, PRICES

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(Thousands of Acres)			
Manitoba	48.0	48.0	43.1	44.0	37.0
Saskatchewan	23.0	16.5	6.7	1.8	2.5
Alberta	7.5	3.5	3.2	[1]	0.5
Canada, Total	78.5	68.0	53.0	45.8	40.0
		(Millions of Pounds)			
Manitoba	25.2	26.4	28.0	35.2	24.0
Saskatchewan	3.5	2.5	3.4	0.8	0.6
Alberta	2.3	0.4	1.4	—	0.15
Canada, Total	30.9	29.2	32.8	36.0	24.7
		(Yield Per Acre, Pounds)			
Manitoba	525	550	650	800	650
Saskatchewan	150	150	500	450	240
Alberta	300	100	450	—	300
Canada, Total	394	430	619	786	618
		(Average Farm Price, Cents Per Pound)			
Canada, Total	4.9	5.9	6.0	4.5	N/A

[1] Less than 500 acres.

Source: DBS, Cat. No. 21-507, and 22-002

TABLE 28
CANADIAN EXPORTS OF SUNFLOWERSEED

(short tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	3	1,239	11	14	10
Belgium/Luxemburg	52	26	—	30	—
Denmark	28	22	—	—	—
Germany, West	1,089	1,697	1,776	143	64
Netherlands	1,674	792	643	—	—
United States	2,397	3,101	6,971	2,802	1,089
Total	5,242	6,877	9,401	2,994	1,162
Total Value (thousands of $)	790	946	1,557	605	264
Average price, (cents per pound)	7.5	6.9	8.3	10.1	11.4

Source: DBS, Trade of Canada

TABLE 29
CANADIAN IMPORTS OF SUNFLOWERSEED OIL[1]

(Thousands of Pounds)

Country of Origin	1967	1968
Netherlands	29,681	20,651
Roumania	4,607	9,411
Germany, West	— —	— 4
USSR	— —	10,022
United States	— —	9
Total	34,289	40,097
Total Value (Thousands of $)	3,630	3,323
Average Price (Cents per pound)	10.6	8.3

[1] Prior to 1967 sunflowerseed oil imports were not reported separately but had been included in the basket class #393-99.

Source: DBS, Trade of Canada

THE CANADIAN MUSTARD SEED SITUATION

Canadian mustard seed acreage has undergone rather erratic changes since 1964, when it amounted to 76,000 acres. It doubled in 1965 and continued to grow gradually to 221,000 acres in 1967. In 1968 expectations of a large market expansion led to a sudden increase to 533,000 acres. When these expectations failed to materialize, farmers reduced the area again to 267,000 acres in 1969 – a 50-per-cent decline from 1968. DBS reports average yields of 966 pounds per acre, an increase of 10 per cent over the previous year. Total production is expected to amount to 258 million pounds, 45 per cent below the record 469 million pounds produced in 1968. DBS states that the acreage seeded to yellow, brown and oriental types of mustard consecutively, in thousands of acres in 1969, was as follows: Manitoba 28.8, 5.6, 26; Saskatchewan 55.8, 100.8, 23.4; Alberta 16.5, 15.0, 18.5.

Saskatchewan, with a seeded area of 180,000 acres, was again the major mustard seed producer, accounting for 68 per cent of the crop. Alberta came second with a drastically reduced area of 50,000 acres and Manitoba third with 37,000 acres.

Mustard seed exports have increased two-and-a-half times from 26,000 tons in 1964 to 66,000 tons in 1968. Although the 1968 crop was more than three times the 1967 output, indications are that exports in 1969 have continued at the same rate as in 1968. Since domestic consumption represents only a small fraction of Canada's total mustard seed production, it must be concluded that the major part of the 1968 crop is still held in storage.

None of the Canadian mustard seed is grown for oil production. All has been used in the past as a condiment. As a result of the large 1968 crop, its utilization by oilseed crushers has been considered. While there is a market for mustard seed oil, the difficulties encountered in the disposition of the mustard seed meal, which is high in progoitrogenic thioglucosides, have so far prevented its use by the oilseed crushing industry.

TABLE 30
CANADIAN MUSTARD SEED: ACREAGE, PRODUCTION, PRICES

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(Thousands of Acres)			
Manitoba	12.0	28.0	31.5	29.0	65
Saskatchewan	29.0	58.0	81.2	78.0	320
Alberta	35.0	70.0	87.9	114.0	148
Canada, Total	76.0	156.0	200.0	221.0	533
		(Millions of Pounds)			
Manitoba	8.7	23.8	17.3	20.3	55.0
Saskatchewan	18.0	46.4	69.0	52.7	288.0
Alberta	23.0	52.5	79.1	77.0	126.0
Canada, Total	49.7	122.7	165.4	149.9	469.0
		(Yield, Pounds per Acre)			
Manitoba	725	850	549	700	846
Saskatchewan	621	800	850	675	900
Alberta	657	750	900	675	851
Canada, Total	654	787	825	678	880
		(Cents per Pound)			
Average Farm Price	4.0	4.7	4.7	N/A	N/A

Source: Based on DBS Data

TABLE 31
CANADIAN EXPORTS OF MUSTARD SEED

(short tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	1,109	3,209	2,016	784	1,041
Belgium/Luxemburg	4,878	4,716	3,080	7,918	7,016
France	–	–	827	–	–
Israel	–	–	20	10	–
Germany, West	2,381	2,118	3,160	6,822	8,331
Italy	33	39	44	–	–
Netherlands	4,347	7,839	10,322	5,421	7,792
Sweden	3	–	33	20	4
Switzerland	95	355	334	390	–
Japan	5,351	6,316	6,720	7,267	9,361
Peru	11	23	17	46	18
Trinidad	–	–	7	5	–
United States	8,169	12,324	24,017	40,178	31,516
Austria	–	–	–	–	113
Australia	–	–	–	–	3
Argentina	–	–	–	–	55
Mexico	–	–	–	–	51
Total	26,377	36,939	50,596	68,859	65,799
Total Value (thousands of $)	2,926	4,656	6,176	7,968	8,661
Average price, (cents per pound)	5.5	6.3	6.1	5.8	6.6

Source: DBS, Trade of Canada

FLAXSEED, LINSEED OIL, LINSEED MEAL

The Canadian flaxseed acreage plunged to the 1-million-acre level in 1967. Coupled with a decrease in yield per acre, the total crop amounted to only 9.4 million bushels. The flaxseed crops of the two other major exporting countries, the United States and Argentina, also declined. As a result the average cash price, basis Fort William, rose to $3.45 5/8 in 1967/68 from $3.00 2/8 the previous season.

In 1968 the acreage increased by nearly 50 per cent to 1.5 million acres. The yield per acre rose to 12.9 bushels and the total crop to 19.7 million bushels — to more than twice the 1967 output. The United States and Argentina also increased their output, and the total world crop rose from 92 million bushels in 1967 to 120.5 million bushels in 1968. The average cash price in 1968/69 declined to $3.30 5/8.

The total value of the flaxseed crop at the farm level amounted to about $60 million in 1966, to $29 million in 1967 and to an estimated $57 million in 1968.

In 1969 wheat farmers turned over more land to flaxseed and the acreage rose by 60 per cent to 2,441,000 acres. At an estimated yield of 12.8 bushels per acre the crop will exceed 31 million bushels.

Manitoba seeded 1.1 million acres to flaxseed, but the relatively low yield of 10.5 bushels per acre resulted in a total crop of only 11.6 million bushels. Saskatchewan and Alberta nearly doubled their acreage to 770,000 and 550,000 acres respectively. The yields were close to 15 bushels per acre and their combined output 19.4 million bushels. Total Canadian supplies for the crop year 1969/70 are estimated at 35.9 million bushels. United States supplies are also expected to increase appreciably from 34.3 million bushels in 1968 to 46 million bushels for the current marketing year. United States flaxseed production increased from 27.3 million bushels (average 12.9 bushels per acre) in 1968 to 36.1 million bushels in 1969. Apart from the increased supply, the export price for flaxseed will be affected downward by the five per cent reduction in the American support price for flaxseed from $2.90 to $2.75 per bushel.

Although the seeded acreage is up by five per cent in Argentina, the crop is expected to be close to the 1968 level of 20 million bushels.

Canada is the world's leading exporter of flaxseed as such, and it is expected that Canadian seed exports in 1969/70 will exceed the 13.4 million bushels exported in 1968/69. In 1968 total world exports of flaxseed and linseed oil in terms of the flaxseed equivalent had dropped to an estimated 35.8 million bushels from a 50-million-bushel level during the preceding eight years. Improved supplies and lower prices will probably result in a return to the previous world export level.

Domestic crushings have declined by 28 per cent to 2.1 million bushels during the past five years. Two mills in Eastern Canada account for about 90 per cent of this volume, and two small plants in Western Canada share the remainder. It is expected that the decline will level off and enable the crushers to serve the needs of a fairly stable market.

Flaxseed exports declined by 21 per cent to 306,845 tons during the calendar year 1968 from 389,751 tons in 1967. Japan remained Canada's major customer with 34 per cent of the total export volume. Britain was in second place with 22 per cent and The Netherlands in third place with 14 per cent. West Germany, Spain, Czechoslovakia, France and Australia were other major customers among a total of 19 countries which purchased flaxseed from Canada in 1968. The value of the total exports dropped to $38.0 million in 1968 from $44.5 million in 1967.

Linseed oil production declined in line with the decrease in crushing volume to 41 million pounds in 1968/69. Trends in domestic utilization are hard to determine. During the crop years 1965/67 apparent disappearance rose to 39 million pounds, and declined by 35 per cent to 25.6 million pounds in 1967/68. In 1968/69 domestic utilization rose to an apparent 31.8 million pounds.

The Dominion Bureau of Statistics lists a breakdown of the consumption of linseed oil by specific industries in its annual census of manufacturers. According to these data the total consumption was 26.7 million pounds in 1965. The paint and varnish industries consumed 18.3 million pounds of linseed oil, i.e., 68.5 per cent of the total. The linoleum and coated fabrics industry came next with 2.9 million pounds or 10.8 per cent, and the plastics and synthetic

resins industries consumed 2.3 million pounds or 8.7 per cent of the total. In 1966 the total volume of linseed oil consumption was reported to be 24.9 million pounds, and the shares of the above industry sectors were the following:

- paint and varnish..... 16.3 mil. lbs. 65.6%
- linoleum and coated fabrics ..... 2.8 mil. lbs. 11.1%
- plastics and synthetic resins ..... 2.3 mil. lbs. 9.1%

The United States Department of Agriculture reported the following data concerning linseed oil utilization in the U.S.A. Total domestic disappearance declined from 497 million pounds in 1956 to an estimated 275 million pounds in 1968. Practically all of this volume is used in drying oil products. The paint and varnish industry consumed 224 million pounds (81.6 per cent), the linoleum and oilcloth, and the resins industries 20 million pounds (5.9 per cent) each.

Canadian exports of linseed oil continue to be destined primarily to Britain. The volume varies from year to year, depending mainly on the competitive supply from Argentina and the United States, the two major exporters of linseed oil. Exports in 1967 were divided about equally between Britain and The Netherlands, totalling 8.9 million pounds. Trade sources question whether the reported exports to The Netherlands were not really made to Britain.

Domestic linseed meal production declined also along with the reduced crushing volume by about 30 per cent during the past five crop years. While 46 per cent of the domestic production was exported in 1964/65, this proportion had declined to 16.5 per cent in 1968/69, reflecting a drop from 23,400 tons to 5,900 tons. This reduction is caused by the gradual disappearance of the British market, which even in 1968 absorbed about 80 per cent of Canada's linseed meal exports. New export markets of any significance have not been developed.

TABLE 32
CANADIAN SUPPLY AND DISPOSITION OF FLAXSEED, LINSEED OIL AND LINSEED MEAL

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(Millions of Bushels)			
Flaxseed					
Stocks, starting[1]	6.6	7.1	11.1	11.8	4.8
Production	20.3	29.2	22.0	9.4	19.7
Total supply	26.9	36.3	33.1	21.2	24.5
Domestic crushings	2.9	2.6	2.5	2.3	2.1
Exports	13.3	18.9	16.6	12.6	13.4
Stocks, July 31	7.1	11.1	11.8	4.8	4.6
Dockage, shrinkage, seed etc.	3.6	3.7	2.2	1.5	4.4
Apparent domestic disappearance	6.5	6.3	4.7	3.8	6.5
		(Millions of Pounds)			
Linseed Oil					
Stocks, starting[2]	4.4	6.6	7.6	8.8	6.1
Domestic production	55.7	51.4	50.5	44.9	41.0
Supply	60.1	58.0	58.1	53.7	47.1
Exports	26.4	11.3	10.1	22.0	10.9
Stocks, July 31	6.6	7.6	8.8	6.1	4.4
Apparent domestic disappearance	27.1	39.1	39.2	25.6	31.8
		(Thousands of Tons)			
Linseed Meal					
Stocks, starting[2]	5.1	0.3	1.0	3.4	5.3
Domestic production	50.9	44.9	43.7	39.1	35.8
Supply	56.0	45.2	44.7	42.5	41.1
Exports	23.4	15.2	14.4	7.0	5.9
Stocks, July 31	0.3	1.0	3.4	5.3	3.3
Apparent domestic disappearance	32.3	29.0	26.9	30.2	31.9

[1] Total stocks in all positions.
[2] Stocks held by crushing plants only.

Source: DBS Data.

TABLE 33
CANADIAN FLAXSEED: ACREAGE, PRODUCTION, PRICES

(Crop Year)

	1964/65	1965/66	1966/67	1967/68	1968/69
		(Thousands of Acres)			
Quebec	36	28	19	17	16
Ontario	23	20	15	7	6
Manitoba	1,025	1,350	1,107	660	820
Saskatchewan	521	560	429	193	397
Alberta	370	355	347	145	285
British Columbia	2	2	2	1	1
Canada, Total	1,977	2,315	1,918	1,023	1,524
		(Millions of Bushels)			
Quebec	0.5	0.4	0.3	0.3	0.3
Ontario	0.4	0.3	0.2	0.1	0.1
Manitoba	10.6	16.2	10.0	5.7	10.4
Saskatchewan	4.5	7.3	6.0	1.6	4.6
Alberta	4.3	4.9	5.5	1.7	4.3
British Columbia	0.02	0.02	0.02	0.01	0.01
Canada, Total	20.3	29.2	22.0	9.4	19.7
		(Yield per Acre: Bushels)			
Quebec	14.3	15.7	15.4	14.9	16.4
Ontario	16.3	15.8	14.8	16.0	16.8
Manitoba	10.3	12.0	9.0	8.6	12.7
Saskatchewan	8.6	13.0	14.0	8.3	11.6
Alberta	11.6	13.8	15.9	11.7	15.1
British Columbia	8.3	11.8	11.8	9.3	11.1
Canada, Total	10.3	12.6	11.5	9.2	12.9
		(Dollars per Bushel)			
Average Farm Price (All Grades)	2.94	2.71	2.72	3.08	N/A

Source: DBS Data.

TABLE 34
CANADIAN FLAXSEED PRICES[1]

(Crop Year)

(cents and eighths per bushel)

	1964/65	1965/66	1966/67	1967/68	1968/69
August	331/1	307/2	300/7	348/3	346/6
September	324/4	314/1	299/2	345	339/6
October	318/4	306/3	292	332/7	332
November	315/2	293/3	290/5	345	321/5
December	314/1	292/5	293/2	345/1	316/1
January	315	299	293/5	348/5	327/7
February	323/1	303/3	295/6	348/6	330/4
March	324/7	297/7	299/6	342/4	325/4
April	321/6	296/3	301/5	332	327/6
May	324/5	292/6	296/5	354/3	329/3
June	319/2	294	304/4	350	327/1
July	312/3	295/7	335/2	354/6	343/5
Yearly average	320/3	299/3	300/2	345/5	330/5

Source: DBS, No. 22-001

[1] Winnipeg Grain Exchange No. 1 C.W. Flaxseed, basis Fort William – Port Arthur.

TABLE 35
CANADIAN EXPORTS OF FLAXSEED

(short tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	141,303	142,356	112,164	91,474	66,341
Ireland	1,008	– –	– –	– –	– –
Belgium/Luxemburg	9,368	11,201	38,588	3,344	2,914
Finland	2,492	– –	2,993	– –	1,023
France	20,296	17,113	11,548	– –	10,283
Germany, West	22,178	31,839	44,439	26,383	16,980
Italy	538	540	8,849	1,139	924
Netherlands	59,471	82,283	123,186	92,992	43,434
Norway	8,850	7,565	11,484	5,497	5,081
Portugal	6,887	2,314	4,830	3,696	2,251
Spain	15,985	10,943	34,343	22,399	15,344
Switzerland	– –	– –	57	– –	1,849
Czechoslovakia	6,753	– –	14,968	10,357	11,203
Germany, East	– –	– –	4,492	– –	– –
Yugoslavia	9,921	25,817	20,504	5,512	– –
Israel	4,611	3,486	2,112	899	1,406
Japan	104,545	114,559	124,282	121,495	104,351
Korea	– –	661	6,679	– –	– –
United States	6	1	48	33	18
Greece	1,422	112	– –	– –	924
Peru	2	– –	– –	2	– –
Denmark	– –	– –	– –	3,026	– –
Morocco	– –	– –	– –	705	8,554
Korea, South	– –	– –	– –	810	2,996
Australia	– –	– –	– –	– –	10,903
Total	415,637	450,790	565,565	389,751	306,845
Total Value (Thousands of $)	48,662	51,658	60,816	44,517	38,014
Average price ($ per bushels)	3.28	3.21	3.01	3.20	3.47

Source: DBS, Trade of Canada

QUALITY OF WESTERN CANADIAN FLAXSEED CROP

Weather conditions in 1967 were most variable in the Prairie Provinces. Harvest weather, however, was exceptionally good, and the flaxseed crop was remarkably free from damage of any kind. Of 2,940 carlots inspected by the Board of Grain Commissioners, 97 per cent were graded No. 1 C.W.

The 1967 flaxseed crop averaged 42.2 per cent in oil content, lower than the average in 1966 of 43.1 per cent, but higher than the average level of 41.7 per cent for the ten previous flax crops. Protein content of the oil-free meal averaged 42.9 per cent in 1967, appreciably higher than the level of 41.2 per cent in 1966, but lower than the ten-year average level of 43.6 per cent. Iodine value, a measure of the utility as a drying oil, averaged 188, somewhat down from the average of 192 recorded in 1966.

In spite of heavy rains in Manitoba, seeding of the 1968 flax crop was accomplished somewhat earlier than in 1967 with about 70 per cent of the total crop planted by May 31 as compared with 55 per cent in 1967.

While rainfall was adequate, temperatures were below average throughout most of the growing season. Frost hit the central and northern areas of the Prairies in mid-August, causing considerable damage. Harvest weather was wet and relatively large amounts of flax were harvested in a tough (10.6-13.5 per cent moisture content) or damp condition (moisture content 13.6 per cent and higher).

It was expected that a larger than usual proportion of the new crop of flaxseed would be graded lower than No. 1 C.W. because of the poor harvest conditions. However, 75-80 per cent of the crop should qualify for grade No. 1 C.W. Of 1,694 carlots of flaxseed inspected by the Board of Grain Commissioners during the first four months of the 1968/69 crop year, 95 per cent were grade No. 1 C.W.

The 1968 flaxseed crop averaged 42.8 per cent in oil content compared with 42.2 per cent in 1967 and an average of 41.8 per cent for the previous ten years. The protein content of the oil-free meal was 39.7 per cent in 1968, down from 42.9 per cent in 1967, and the lowest level ever encountered in the Grain Research Laboratory's annual harvest survey. The average iodine value had increased considerably from 188 in 1967 to 194 in 1968.

TABLE 36
QUALITY DATA FOR WESTERN CANADIAN FLAXSEED, SURVEY SAMPLES OF 1967 AND 1968 CROPS

	Oil Content		Iodine Value		Protein Content		No. of
	Mean	Range	Mean	Range	Mean	Range	Samples
				1967			
Western Canada							
No. 1 CW	42.4	38.9 – 45.0	189	180 – 198	42.9	35.4 – 48.5	213
No. 2 CW	41.5	37.9 – 43.4	187	182 – 190	44.6	36.7 – 47.2	9
No. 3 CW	38.0	36.2 – 42.8	186	184 – 190	40.3	37.4 – 45.3	5
All Grades	42.2	36.2 – 45.0	188	180 – 198	42.9	35.4 – 48.5	227
All Grades							
Manitoba	42.3	36.2 – 45.0	189	180 – 198	42.5	35.4 – 48.5	143
Saskatchewan	42.1	37.0 – 44.9	188	180 – 196	43.9	37.2 – 47.8	66
Alberta	42.2	41.0 – 44.5	188	182 – 195	42.3	38.1 – 47.2	18
				1968			
Western Canada							
No. 1 CW	43.2	40.1 – 46.4	193	182 – 201	39.9	31.4 – 48.4	160
No. 2 CW	42.1	38.8 – 45.3	195	185 – 201	40.8	34.2 – 49.0	32
No. 3 CW	39.9	33.1 – 45.0	196	190 – 200	35.8	29.2 – 45.5	16
No. 4 CW	41.6	41.0 – 42.1	196	190 – 201	38.4	35.4 – 41.5	2
All Grades	42.8	33.1 – 46.4	194	182 – 201	39.7	29.2 – 49.0	210
All Grades							
Manitoba	42.9	33.1 – 46.4	194	184 – 201	39.3	29.2 – 49.0	112
Saskatchewan	42.6	36.5 – 45.3	194	184 – 201	42.5	33.9 – 48.4	49
Alberta	42.7	36.9 – 45.7	194	182 – 201	38.0	31.4 – 43.9	49

NOTE: The oil content of the seed and the protein content of the oil-free meal are reported on a moisture-free basis.

Source: Grain Research Laboratory, Board of Grain Commissioners, Winnipeg

TABLE 37
CANADIAN EXPORTS OF LINSEED OIL

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	17,998	22,497	11,211	4,439	22,967
Syria	9	– –	– –	– –	– –
Nigeria	10	– –	– –	– –	– –
Peru	6	– –	4	– –	1
Venezuela	66	4	– –	– –	– –
Bermuda	6	– –	– –	– –	1
British Honduras	1	– –	– –	– –	– –
Barbados	13	12	11	11	2
Jamaica	1	– –	– –	– –	– –
Leew.-Wind. Is.	1	1	– –	– –	– –
Cuba	881	– –	– –	– –	– –
Netherlands Antilles	3	1	– –	– –	– –
United States	1	– –	1,129	– –	14
Ecuador	– –	3	– –	– –	– –
Netherlands	– –	– –	– –	4,483	– –
Total	18,996	22,518	12,359	8,939	22,986
Total Value (thousands of $)	2,281	2,598	1,276	869	2,624
Average price (cents per pound)	12.0	11.5	10.3	9.7	11.4

Source: DBS, Trade of Canada

TABLE 38
CANADIAN EXPORTS OF LINSEED OIL CAKE AND MEAL

(short tons)

Destination	1964	1965	1966	1967	1968
United Kingdom	12,145	21,278	9,336	6,304	4,133
F. Guiana	192	114	– –	– –	– –
Barbados	38	12	2,626	575	56
Leew.-Wind. Is.	117	114	185	161	67
Trinidad	860	735	878	– –	– –
United States	743	1,002	556	96	531
Ireland	1,046	– –	1,544	56	– –
Guyana	– –	– –	– –	118	9
Trinidad-Tobago	– –	– –	– –	735	320
Venezuela	– –	– –	– –	– –	11
Netherlands-Antilles	– –	– –	– –	– –	3
Total	15,141	23,255	15,257	8,046	5,139
Total Value (thousands of $)	1,260	1,897	1,347	755	467
Average price ($ per ton)	83.22	81.57	88.29	93.80	91.10

Source: DBS, Trade of Canada

CANADIAN TRADE IN SPECIFIED EDIBLE FATS AND OILS

There are several vegetable oils imported into Canada from the United States and from tropical countries which are interchangeable with domestically produced oils in the manufacture of various final products. Depending on relative prices as well as on their properties, they compete for a share of the Canadian market.

Imports

	1967	1968
	(millions of pounds)	
Cottonseed Oil	11.5	10.6
Palm Oil	21.6	18.7
Peanut Oil	26.6	27.7
Vegetable Oils and Fats	17.4	2.7
Sub-Total	77.1	59.7
Sunflowerseed Oil	34.3	40.1
TOTAL	111.4	99.8

Compared with 1966, when the combined import of these oils reached 129.3 million pounds, there has been a significant decrease of the import of these commodities despite the sharp rise in sunflowerseed oil imports. Sunflowerseed oil was included in the basket class "Vegetable Oils and Fats" prior to 1967.

Cottonseed oil imports decreased from 32.2 million pounds in 1966 to 11.5 million pounds in 1967 as a consequence of the lower U.S. output. Although there has been some recovery in U.S. cottonseed oil production, the output has not reached the level of former years.

Palm oil imports, too, declined from a high of 26.8 million pounds in 1966 to 18.7 million pounds in 1968. All palm oil comes from Malaysia where serious efforts to increase the crop are in progress. Even the lower price of 7.9 cents in 1968 had as yet no influence on the import volume. Supplies are expected to increase within a few years.

Peanut oil continued to be imported primarily from Nigeria. Imports from the U.S. have declined further. Total imports remained relatively high at 27.7 million pounds in 1968 and were used mainly in salad oils and for special frying purposes.

Imports under the heading "Vegetable Oils and Fats" declined from 17.4 million pounds in 1967 to a relatively insignificant 2.7 million pounds in 1968. The decline was caused by the disappearance of European rapeseed oil, which was no longer competitive in the Canadian market.

Other Imports

Cocoa butter imports showed an increase in 1968, reaching 16.5 million pounds worth $11.2 million. Nigeria appeared for the first time as a significant supplier next to the traditional producers led by Ghana, The Netherlands and Britain.

Coconut oil imports continued to grow at a moderate rate. More than half of Canada's requirements were imported from Malaysia, and Britain increased its coconut oil exports to Canada. Ceylon was again not able to compete successfully in the Canadian market after a recovery in 1967 from a slump in 1966.

Corn oil imports levelled off at a lower level of 14-15 million pounds following an increase in 1966. While the United States supplied most of Canada's import requirements in the past, in 1968 they shared the major portion about equally with The Netherlands. Total Canadian production of fully refined corn oil was constant at 24-25 million pounds during the past two years (Tables 73 and 73A). It does not appear that the new Food and Drug labelling regulations concerning polyunsaturation had any significant effect on corn oil consumption.

Olive oil imports remained fairly constant. Price is obviously the decisive factor limiting any significant growth.

Palm kernel oil imports increased by about one third in 1967 and 1968 as compared with 1966. Similar to coconut oil, its usage is generally restricted to special markets, where this oil is not easily interchangeable.

TABLE 39
CANADIAN IMPORTS OF COCOA BUTTER

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	2,541	2,070	4,821	2,714	2,475
Germany, West	11	28	– –	– –	– –
Italy	143	– –	– –	– –	– –
Netherlands	2,616	1,196	779	2,522	3,635
Poland	42	– –	– –	– –	– –
China, Communist	– –	45	– –	– –	– –
Ghana	7,531	9,724	8,928	6,968	6,513
Jamaica	146	56	235	477	116
Trinidad-Tobago	100	50	100	54	– –
United States	29	16	20	86	695
Brazil	– –	– –	661	– –	496
Philippines	– –	– –	– –	11	– –
Mexico	– –	– –	– –	110	– –
Ireland	– –	– –	– –	– –	81
Nigeria	– –	– –	– –	– –	2,480
Dominican Republic	– –	– –	– –	– –	55
Total	13,157	13,185	15,545	12,943	16,546
Total Value (thousands of $)	7,388	6,658	8,065	7,865	11,186
Average Price (cents per pound)	56.1	50.6	52.0	60.8	67.6

Source: DBS, Trade of Canada

TABLE 40
CANADIAN IMPORTS OF COCONUT OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	9,007	354	3,109	6,867	12,355
Germany, West	7	7	2	5	5
Ceylon	22,464	18,257	1,841	17,374	3,275
Malaysia	4,707	14,124	28,262	16,168	24,747
Philippines	1,968	2,386	3,275	– –	– –
United States	1,528	2,931	6,152	4,152	2,441
Fiji	– –	57	– –	– –	2,213
Australia	– –	1,502	– –	– –	– –
Singapore	– –	– –	– –	– –	92
Netherlands	– –	– –	– –	– –	9
Hong Kong	– –	– –	– –	– –	5
Total	39,750	39,618	42,641	44,566	45,142
Total Value (thousands of $)	5,329	6,122	5,800	5,823	7,612
Average price (cents per pound)	13.4	15.5	13.6	13.1	16.9

Source: DBS, Trade of Canada

TABLE 41
CANADIAN IMPORTS OF CORN OIL[1]

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	898	1,598	667	1,125	1,792
Netherlands	1,102	–	1,963	2,282	6,622
United States	15,067	12,779	15,922	10,614	6,544
France	–	–	886	–	448
Germany, West	–	–	870	–	–
Total	17,067	14,377	20,308	14,021	15,406
Total Value (thousands of $)	2,068	2,341	3,706	1,991	2,364
Average price (cents per pound)	12.1	16.3	18.2	14.2	15.3

[1] Until December, 1963, Corn oil was included with class 1620 Vegetable Oils, Crude and Refined, n.o.p.

Source: DBS, Trade of Canada

TABLE 42
CANADIAN IMPORTS OF COTTONSEED OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Netherlands	–	–	3,514	–	–
United States	37,422	47,646	28,711	11,459	10,648
Total	37,422	47,646	32,225	11,459	10,648
Total Value (thousands of $)	4,247	6,102	4,646	1,549	1,436
Average price (cents per pound)	11.3	12.8	14.4	13.6	13.5

Source: DBS, Trade of Canada

TABLE 43
CANADIAN IMPORTS OF OLIVE OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Germany, West	–	–	2	48	13
France	94	159	84	43	85
Greece	247	410	317	729	564
Italy	1,012	653	1,030	1,311	1,146
Portugal	240	163	296	354	369
Spain	1,869	1,093	1,571	1,887	1,610
Israel	1	1	–	–	1
Turkey	11	10	–	–	–
Tunisia	48	–	–	3	–
United States	183	244	71	171	224
Total	3,705	2,731	3,371	4,546	4,013
Total Value (thousands of $)	1,191	1,008	1,250	1,725	1,528
Average price (cents per pound)	32.2	36.7	37.1	38.0	38.1

Source: DBS, Trade of Canada

TABLE 44
CANADIAN IMPORTS OF PALM OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Malaysia	13,112	18,913	26,289	19,721	18,736
United Kingdom	–	–	–	400	–
Singapore	–	–	–	1,502	–
Total	13,112	18,913	26,761	21,623	18,736
Total Value (thousands of $)	1,393	2,180	2,800	2,203	1,478
Average price (cents per pound)	10.6	11.5	10.5	10.2	7.9

Source: DBS, Trade of Canada

TABLE 45
CANADIAN IMPORTS OF PALM KERNEL OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	6,097	8,466	278	521	1,401
Netherlands	409	221	318	316	829
Nigeria	821	–	8,463	10,358	9,714
United States	–	121	121	121	155
Congo-Kinshasa	–	–	–	806	–
Congo-Leopoldville	–	1,068	–	–	–
Total	7,327	9,877	9,182	12,121	12,099
Total Value (thousands of $)	1,053	1,656	1,318	1,568	2,027
Average price (cents per pound)	14.4	16.8	14.4	12.9	16.8

Source: DBS, Trade of Canada

TABLE 46
CANADIAN IMPORTS OF PEANUT OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Netherlands	–	–	1,365	1,093	5,159
United Kingdom	135	5	3,394	46	–
France	57	56	38	100	85
Nigeria	7,271	5,205	24,084	21,954	20,921
Hong Kong	128	129	129	179	168
United States	2,056	3,852	2,545	2,413	1,348
Rep. of South Africa	–	–	–	840	–
Total	9,647	9,247	31,555	26,623	27,680
Total Value (thousands of $)	1,213	1,421	4,499	3,786	3,388
Average price (cents per pound)	12.6	15.4	14.3	14.2	12.2

Source: DBS, Trade of Canada

TABLE 47
CANADIAN IMPORTS OF VEGETABLE OILS AND FATS

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	224	164	59	91	371
Austria	3	14	10	14	15
Germany, West	2,209	3,286	4,756	1,417	13
Netherlands	668	24	32,513	14,975	546
Sweden	41	2,808	10	30	–
Hong Kong	16	14	11	18	27
Japan	6	7	5	7	13
United States	2,074	1,154	1,279	859	1,705
Denmark	16	15	16	16	36
Israel	–	–	–	5	5
Cuba	–	–	–	4	–
Yugoslavia	–	–	–	–	2
Total	5,256	7,488	38,664	17,436	2,732
Total Value (thousands of $)	755	1,064	5,090	1,849	518
Average price (cents per pound)	14.4	14.2	13.2	10.6	19.0

Source: DBS, Trade of Canada

TABLE 48
CANADIAN EXPORTS OF VEGETABLE OILS AND FATS[1]

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
Republic of South Africa	1	–	–	–	–
Japan	16	–	–	–	–
Jamaica	–	2	–	–	3
Leew. -Wind Is.	3	9	7	16	13
Cuba	–	3	5	9	7
United States	384	512	435	834	1,169
Cyprus	–	1	–	–	4
Australia	–	23	23	–	5,291
British Guiana	6	40	12	–	–
Bermuda	3	40	–	–	–
British Honduras	–	2	2	3	2
Barbados	36	34	47	111	43
Trinidad-Tobago	4	13	7	5	20
Bahamas	–	–	3	–	14
Germany	9	–	–	–	–
Guyana	–	–	–	45	32
Chile	–	–	–	65	–
Nicaragua	–	–	–	6	2
United Kingdom	–	–	–	1	114
Malta and Gozo	–	–	–	–	16
Kuwait	–	–	–	–	2
Nigeria	–	–	–	–	42
Sierra Leone	–	–	–	–	5
Togo	–	–	–	–	3
Hong Kong	–	–	–	–	242
Belgium-Luxembourg	–	–	–	–	1
Total	458	677	543	1,100	7,024
Total Value (thousands of $)	79	130	114	113	819
Average Price (cents per pound)	17	19	21	10	12

[1] This export class No. 39-399 includes sunflower oil, salad and cooking oil and certain specialty fats like pan greases.

Source: DBS, Trade of Canada

TABLE 49
CANADIAN IMPORTS OF CASTOR OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	2	7	5	–	–
India	21	11	13	12	–
Brazil	5,193	4,830	3,418	3,115	4,927
United States	222	161	218	1,318	748
Netherlands	–	1,769	546	–	–
Japan	–	–	427	1,495	–
Total	5,438	6,778	4,627	5,940	5,675
Total Value (thousands of $)	618	801	644	1,057	1,233
Average price (cents per pound)	11.4	11.8	13.9	17.8	21.7

Source: DBS, Trade of Canada

TABLE 50
CANADIAN IMPORTS OF OITICICA OIL

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Brazil	214	204	149	21	20
United States	32	–	–	–	–
Total	246	204	149	21	20
Total Value (thousands of $)	50	49	30	4	3
Average price (cents per pound)	20.3	24.0	20.1	19.0	15.0

Source: DBS, Trade of Canada

TABLE 51
CANADIAN IMPORTS OF TUNG OIL[1]

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	11	–	–	–	–
Hong Kong	1,101	948	1,623	476	–
Paraguay	208	62	–	231	558
United States	232	198	96	776	911
Argentina	1,307	934	789	564	439
China, Communist	–	–	–	67	67
Brazil	–	–	–	34	–
Total	2,860	2,142	2,508	2,148	1,975
Total Value (thousands of $)	744	547	514	322	258
Average price (cents per pound)	26.0	25.5	20.5	15.0	13.1

[1] Reported as Chinawood Oil until 1963, and as Chinawood/Tung Oil since 1964.

Source: DBS, Trade of Canada

TABLE 52
CANADIAN IMPORTS OF CHEMICALLY MODIFIED OILS, FATS AND WAXES

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	18	128	16	7	35
Germany, West	40	90	83	154	218
Netherlands	157	129	292	120	30
Rep. South Africa	–	–	16	–	–
United States	14,331	12,632	8,184	12,543	6,402
Norway	10	10	–	10	10
Switzerland	–	–	–	40	–
Total	14,556	12,989	8,591	12,873	6,695
Total Value (thousands of $)	2,197	2,277	1,679	2,144	1,279

Source: DBS, Trade of Canada

TABLE 53
CANADIAN IMPORTS OF MIXTURES AND DERIVATIVES OF OILS, FATS AND WAXES

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	98	91	27	11	9
Germany, West	49	29	2	3	49
Netherlands	9	12	4	12	2
United States	7,750	9,726	11,091	3,818	5,046
Sweden	3	–	–	–	–
France	–	–	–	4	–
Total	7,909	9,859	11,124	3,848	5,106
Total Value (thousands of $)	1,191	1,112	1,163	524	702

Source: DBS, Trade of Canada

TABLE 54
CANADIAN EXPORTS OF CHEMICALLY MODIFIED OILS, FATS AND WAXES

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	104	227	465	739	356
Syria	5	–	10	–	–
Australia	1,040	1,104	1,286	1,735	781
British Guiana	31	83	81	–	–
Peru	–	5	5	–	–
Venezuela	91	125	81	135	170
United States	1,890	1,595	1,847	1,107	588
Ecuador	2	–	–	3	–
Leew.-Wind. Is.	2	3	–	–	–
Honduras	1	–	–	–	–
Barbados	1	5	–	–	–
Trinidad	2	1	–	–	–
Netherlands Antilles	–	7	–	3	–
Jamaica	13	–	–	–	–
Guatemala	2	–	–	–	–
France	–	–	–	113	75
Rep. of South Africa	–	–	–	4	–
Japan	–	–	–	41	–
Guyana	–	–	–	249	60
Bahamas	–	–	–	4	–
Bermuda	–	–	–	4	–
Cuba	–	–	–	41	–
New Zealand	–	–	–	–	45
Total	3,184	3,156	3,779	4,178	2,075
Total Value (thousands of $)	257	258	303	491	225

Source: DBS, Trade of Canada

MARINE OIL AND FISH MEAL SITUATION

The Development of the East Coast Reduction Industry

Canadian production of marine oils was fairly constant at 58-59 million pounds during the years 1964-66. West Coast herring oil output declined gradually while East Coast production got started in several new reduction plants. In 1967 East Coast herring oil production continued to rise steeply to 39.3 million pounds, while the output on the West Coast dropped to 7.8 million pounds. The herring population on the West Coast disappeared completely and oil output has been minimal. It is not clear whether over-fishing or environmental changes were responsible for the disappearance of herring. Careful studies are showing that particularly in some southern areas around Vancouver Island spawnings are again on the increase. It is hoped that the reduction industry will be revived within a few years.

Meanwhile the expansion of the reduction industry on the Atlantic Coast has gone ahead at a fast pace. In 1968 total herring oil output of 67.5 million pounds contributed to the record total of 87.5 million pounds. During the first half of 1969 herring oil output was only 1.7 million pounds above the volume for the corresponding period in 1968.

Herring landings on the Atlantic Coast rose from 570 million pounds in 1966 to 757 million pounds in 1967 and 1,152 million pounds in 1968, a most striking growth. In fact, in 1968 herring landings accounted for 42 per cent of the total Canadian seafish landings of 2,735 million pounds. New Brunswick led all provinces with 425 million pounds, followed by Nova Scotia with 352 million pounds and Newfoundland with 321 million pounds. The average landed value of Atlantic herring was 1.07 cents per pound.

While most of the herring was converted into oil and meal, a substantial part of the landings in New Brunswick was used in sardine canning. A small but growing volume of herring is being exported for human consumption. Consequently it is difficult to calculate the trends in oil yield of Atlantic Coast herring reduction.

Since 1965, 13 plants of a capacity of 250 tons of fish and above per day have either been newly built or have been expanded on the Atlantic Coast. Their total herring reduction capacity is about 9,650 tons per day out of a total fish reduction capacity of an estimated 15,400 tons. A few plants have been closed because of uneconomic operations.

It can be assumed that at least 10,000 tons per day of reduction capacity on the Atlantic Coast are designed to process herring primarily. It can also be assumed that 400,000–500,000 tons of the 1968 herring landings may have passed through these plants. Consequently they operated on the average for less than 50 whole days per year. An average operating time of closer to 100 days per year is generally regarded as economically desirable and essential in the reduction of whole oily fish.

The following calculation gives an estimate of the overall input-output of this new Atlantic Coast herring reduction industry for the year 1968:

Total herring meal production amounted to 86,539 tons. Assuming a yield of 17.5–20 per cent, the total herring input was 433,000–495,000 tons, or an average of 464,000 tons. Herring oil production was about 67.5 million pounds, i.e., an average oil yield of approximately 7.3 per cent on a raw herring basis.

Marine Oil Situation

Herring oil accounted for 77 per cent of Canada's total marine oil output of 87.5 million pounds in 1968. This increase in total output from 64.1 million pounds in 1967 can be credited mainly to the expansion of herring oil production. The increase in body and offal oil derived from ground fish from 3.8 million pounds in 1967 to 6.1 million pounds in 1968 was probably due mainly to increased processing of redfish. Although detailed data are not available, the production of whale oil has also shown a substantial growth during 1967 and 1968.

Marine oil imports have declined from a high of 10.2 million pounds in 1966 to 3.8 million pounds in 1968. Except for whale oil the exports of edible marine oils have been rather insignificant since 1966. Sun-rotted cod liver oil, used in various industrial applications, continues to be exported at the rate of around 5 million pounds annually (Table 58).

Since stock data are not available, the calculated domestic disappearance indicates only the order of magnitude. As for the edible portion, which obviously comprises the bulk of all domestic utilization, accurate information can be obtained from the production of fully deodorized fats and oils given in Tables 73 and 73A. In 1967 refined marine oil production amounted to 51.7 million pounds and in 1968 to 55.4 million pounds. Approximately two thirds are used in margarine and one third in shortening manufacture.

Herring oil prices, delivered Toronto, declined from about 9.25 cents per pound early in 1967 to 5.5 cents at the end of 1968. Prices remained low during most of 1969. In response to a general rise in edible oil prices during the second part of 1969, East Coast herring oil was quoted in Toronto above 10 cents per pound at the end of 1969.

Fish Meal Situation

Total Canadian production of fish meal has undergone a dramatic increase by 77 per cent from 76,100 tons in 1964 to 135,000 tons in 1969. While the increase of herring meal output to 87,000 tons of the total in 1968 was part of the development of this new industry sector on the Atlantic Coast, ground fish meal production also rose substantially from 25,300 tons to 47,700 tons during this period (Table 61). In terms of the world fish meal production (Table 65) of an estimated 5.3 million tons in 1968, the Canadian contribution is not very significant.

Canadian imports of fish meal are insignificant. Exports fluctuated (Table 63) and reached a high of 69,800 tons in 1968. In the absence of stock data, the values given for domestic disappearance in Table 60, reflect mainly a rapid increase in domestic utilization. Domestic utilization apparently outpaced the growth of exports. Low fish meal prices during 1967 and 1968 must have accelerated this trend.

The price per metric ton of 65 per cent Peruvian fish meal, c.i.f. Hamburg, may be used to illustrate the price development: the average for 1967 was $(U.S.) 134 and $(U.S.) 129 for 1968. By December 1969 the price had climbed to above $(U.S.) 200, mainly as a result of substantially decreased production in Peru and also in Norway.

TABLE 55
CANADIAN SUPPLY AND DISPOSITION OF MARINE OILS

(millions of pounds)

	1964	1965	1966	1967	1968
Production	58.3	59.6	58.6	64.1	87.5
Imports	1.1	8.2	10.2	7.9	3.8
Supply	59.4	67.8	68.8	72.0	91.3
Exports	34.7	19.7	8.9	24.4	13.6
Apparent domestic disappearance	24.7	48.1	59.9	47.6	77.7

Source: Based on DBS Data

TABLE 56

CANADIAN PRODUCTION OF MARINE OILS BY TYPES AND AREAS

OIL	1964	1965	1966	1967	1968	1968	1969
	(millions of pounds)					(six months ended June)	
Atlantic Coast							
Ground fish body and offal	1.4	2.0	2.5	3.8	6.1	.7	.9
Liver	5.8	4.6	4.1	3.2	2.9	.9	.9
Herring	4.7	7.2	15.9	39.3	67.5	22.2	23.9
Other fish liver	[1]	[1]	[1]	[1]	0.4	—	—
Seal	1.3	3.0	3.3	2.2	3.0	[1]	1.0
Other	0.6	1.0	4.3	7.8[2]	7.5	2.3	.9
ATLANTIC TOTAL	13.8	17.8	30.1	56.3	87.3	26.2	27.7
Pacific Coast							
Herring	44.5	41.8	28.5	7.8	.2	.2	—
TOTAL, CANADA	58.3	59.9	58.6	64.1	87.5	26.4	27.7

[1] Confidential, included with other.
[2] Includes primarily whale oil.

Source: DBS No. 24-002

TABLE 57

CANADIAN IMPORTS OF MARINE OILS BY TYPES

(millions of pounds)

	1964	1965	1966	1967	1968
Fish liver and visceral oil	0.1	0.3	0.1	[2]	[2]
Fish and marine animal oil	1.0[1]	7.9	10.1	7.9	3.8
Total	1.1	8.2	10.2	7.9	3.8
Total Value (thousands of $)	168	862	863	610	325

[1] Includes Whale Oil, previously included in Class 2297; Change in classification.

[2] The imports of Fish Liver and Visceral Oil, Class 392-29, had become rather insignificant. Starting in January 1967, the imports of this class have been included with Fish and Marine Animal Oil.

Source: DBS, Cat. No. 65-007

TABLE 58

Canadian Exports of Marine Oils by Types

(millions of pounds)

	1964	1965	1966	1967	1968
Herring oil	23.3	7.6	0.8	4.2	0.3
Cod liver oil, sun-rotted	7.0	5.1	4.5	5.8	5.0
Fish and marine animal oil, n.e.s.	1.1	2.5	2.2	1.9	3.2
Whale oil	3.2	4.5	1.4	12.5	5.1
Total	34.7	19.7	8.9	24.4	13.6
Total Value (thousands of $)	2,993	1,929	798	1,612	710

Source: Based on DBS, No. 65-004

TRENDS IN THE USE OF MARINE OILS IN MARGARINE AND SHORTENING

The absence of stock data and of accurate information on refining losses make it difficult to relate domestic production of fish oils to consumption. The values used for the consumption of fish oils in margarine and shortening represent the amounts of fully refined oils reported by refiners as ingredients for these products. Total margarine and shortening production closely parallels the refinery output, but — especially in the case of margarine — may be somewhat higher due to imported base stock. This imported base stock is not likely to contain fish oils. Recalculating the marine oil portion of total fats used in margarine manufacture would reduce the percentage from 23.2 to 22.2 in 1967, and from 27 to 25.1 in 1968. In the case of shortenings, the difference is too small to be meaningful.

The use of fish oils in margarine has shown a rising tendency in recent years after a sharp decline in 1964. Low oil prices in 1962 and 1963 had led to sharply increased usage, largely with the help of imports. In 1964 imports dropped off drastically, and the domestic requirements since then have been met primarily by domestic production.

More than two thirds of all fish oils consumed in Canada go into margarine, i.e. 39.1 million pounds in 1968, equivalent to 27 per cent of all oils used in the manufacture of margarine base stock.

The share of marine oil in the manufacture of shortenings has not recovered from the decline following the high usage of low-priced marine oils in 1961-1963. While the actual volume ranged from 13.5 to 18.8 million pounds between 1964 and 1968, its proportion of all oils used in shortening manufacture declined from 7 to 5.7 per cent during the same period.

Looking at the total edible utilization of refined marine oils in Canada, the volume increased by 28 per cent from 43.2 million pounds in 1964 to 55.4 million pounds in 1968. Most of this oil was herring oil. In view of the decline of the Pacific herring fishery, it was possible to supply this oil from domestic resources only as a result of the rapid growth of the herring industry on the Atlantic Coast.

TABLE 59

Use of Marine Oils in Margarines and Shortenings

Year	Used in Margarine (mill. lbs.)	Per Cent of Total Fats in Margarine	Used in Shortening (mill. lbs.)	Per Cent of Total Fats in Shortening	Total Marine Oils in Margarine and Shortening (mill. lbs.)	Per Cent of Total Fats in Margarine and Shortening
1960	12	9.1	8	4.5	20	6.0
1961	32	21.3	17	10.2	49	13.9
1962	48.3	31.6	21.6	11.9	69.9	20.9
1963	64.6	46.7	22.9	12.4	87.5	27.1
1964	29.7	20.9	13.5	7.0	43.2	12.8
1965	30.0	22.1	14.7	7.7	44.7	13.7
1966	[1]	[1]	[1]	[1]	48.4	12.1
1967	32.9	23.2	18.8	6.7	51.7	12.2
1968	39.1	27.0	16.3	5.7	55.4	12.8

[1] Breakdown for margarine and shortening not available in 1966 due to a change in DBS reporting procedure.

Source: Based on DBS Data

TABLE 60

Canadian Supply and Disposition of Fish Meal

	1964	1965	1966	1967	1968
		(thousands of tons)			
Production	76.1	96.6	96.2	98.5	135.0
Imports	4.9	0.1	[1]	1.1	2.7
Supply	81.0	96.7	96.2	99.6	137.7
Exports	62.5	58.9	53.0	52.1	69.8
Apparent domestic disappearance	18.5	37.8	43.2	47.5	67.9

[1] Less than 50 tons.

Source: Based on DBS Data

TABLE 61

Canadian Production of Fish Meals by Types and Area

	1964	1965	1966	1967	1968
		(thousands of tons)			
Atlantic Coast					
Groundfish	25.3	42.8	41.6	38.2	47.7
Herring	6.2	12.8	25.9	48.8	86.5
Other	0.6	0.9	1.5	1.6	0.4
Atlantic Total	32.1	56.5	69.0	88.5	134.6
Pacific Coast					
Herring	44.0	40.1	27.2	10.0	0.4
Canada, Total	76.1	96.6	96.2	98.5	135.0

Source: Based on DBS, Cat. No. 24-002

TABLE 62

Canadian Imports of Fish Meal

(thousands of tons)

Country of Origin	1964	1965	1966	1967	1968
United States	0.1	0.1	(1)	(1)	0.1
Republic of South Africa	4.8	—	—	—	—
Peru	—	—	—	1.0	1.3
Chile	—	—	—	—	1.3
Total	4.9	0.1	(1)	1.1	2.7
Total Value (thousands of $)	552	10	1	102	261
Average price ($ per ton)	106.5	100.0	—	92.7	96.7

(1) Less than 50 tons.

Source: DBS Cat. No. 65-007

TABLE 63

Canadian Exports of Fish Meal and Condensed Solubles

(thousands of tons)

	1964	1965	1966	1967	1968
Herring meal and pilchard meal ...	50.5	40.1	36.7	37.3	50.0
Fish meal n.e.s.	12.0	18.8	16.3	14.8	19.8
Fish condensed homogenized solubles	1.9	1.8	1.6	1.3	1.0
Total (meal only)	62.5	58.9	53.0	52.1	69.8
Total Value (meal only, thousands of $)	8,851	9,336	9,379	7,863	9,647

Source: DBS, Trade of Canada

TABLE 64

WORLD FISH OIL PRODUCTION

(Includes Fish Liver Oil, Major Producing Countries)

(thousands of short tons)

Continent and Country	Average 1960/64	1965	1966	1967	1968[1]
North America					
Canada	25.1	29.4	27.4	30.9	37.7[2]
United States	106.8	96.4	81.3	60.0	85.8
Other[3]	.5	2.2	4.0	4.9	7.8
TOTAL	132.4	128.0	112.7	95.8	131.3
South America					
Chile	12.3	11.1	24.9	11.5	40.7
Peru	149.0	137.7	161.7	286.6	308.6
Other[3]	1.5	4.3	5.3	6.6	5.8
TOTAL	162.8	153.1	191.9	304.7	355.1
Europe					
Denmark	26.2	43.8	47.5	67.5	77.4
Germany, West	29.0	22.0	21.7	21.2	18.2
Iceland	64.2	114.2	143.9	81.5	33.3
Norway	81.6	196.8	263.4	372.0	276.7
Portugal	8.3	10.1	9.0	9.4	9.7
United Kingdom	20.3	14.4	13.3	15.4	14.4
Other[3]	14.3	16.6	18.9	25.5	24.3
TOTAL	243.9	417.9	517.7	592.5	454.0
U.S.S.R.	29.7	48.5	54.0	60.6	62.8
Africa					
Morocco[4]	5.3	1.4	5.9	9.1	12.0
Angola	5.6	6.2	5.1	4.9	4.4
South West Africa	27.9	39.0	38.0	42.3	78.5[2]
South Africa, Rep. of	34.7	26.4	17.9	29.8	54.5[2]
TOTAL	73.5	73.0	66.9	86.1	149.4
Asia					
Japan	39.6	38.0	40.0	46.3	61.0
Other[3]	2.4	3.5	2.6	2.6	2.6
TOTAL	42.0	41.5	42.6	48.9	63.6
World Total (estimated)	684.3	862.0	985.8	1,188.6	1,216.2

[1] Preliminary. [2] Estimated. [3] Includes estimates for minor producing countries.
[4] Exports only.

Source: USDA: World Agricultural Production and Trade.

TABLE 65

World Fish Meal Production: (Selected Countries)

(thousands of short tons)

Continent and Country	Average 1960/64	1965	1966	1967[2]	1968[2]
North America					
Canada	75.4	88.1	99.6	98.2	124.7[3]
United States	329.8	301.2	264.8	247.4	270.0
Mexico	5.9	7.8	10.9	11.7	12.1
Other	1.7	6.2	11.5	11.6	12.0
Total	412.8	403.3	386.8	368.9	418.8
South America					
Argentina	6.4	17.4	24.3	29.2	20.6
Chile	105.1	103.8	244.0	180.1	260.1
Peru	1,151.0	1,413.1	1,620.9	2,001.8	2,118.6
Other	6.9	7.6	11.4	13.6	15.9
Total	1,269.4	1,541.9	1,900.6	2,224.7	2,415.2
Europe					
Denmark	89.3	124.1	107.7	177.2	255.7
France	14.0	14.6	15.0	14.6	14.9
Germany, West	89.4	88.6	87.3	97.0	76.8
Iceland	96.9	191.7	193.9	122.9	57.3
Netherlands	8.2	6.5	10.6	5.5	6.0[3]
Norway	159.2	352.3	465.0	542.0	443.0
Portugal	7.0	8.8	12.0	7.7	7.2[3]
Spain	30.6	37.6	37.4	36.5	39.1
Sweden	7.0	7.1	7.6	7.7	7.7[3]
United Kingdom	82.9	95.1	96.3	89.5	97.8
Poland	7.3	18.6	22.4	23.7	24.2[3]
Other	6.1	11.2	18.8	23.0	22.9
Total	597.9	956.2	1,074.0	1,147.3	1,052.6
USSR (Europe and Asia)	114.2	223.3	262.9	325.1	330.7
Africa					
Morocco[4]	20.0	8.3	40.9	27.9	42.1
Angola	48.6	51.7	53.0	45.8	50.7
South West Africa	110.8	171.1	175.0	189.7	262.8[3]
South Africa, Rep. of	121.1	131.4	120.2	201.2	269.0[3]
Other	2.3	.9	1.4	1.6	1.6[3]
Total	302.8	363.4	390.5	466.2	626.2
Asia:					
Australia	1.1	.9	.9	.9[3]	.9[3]
Japan	333.4	376.1	392.6	447.9	467.9
Other	7.5	9.7	9.5	10.5	9.2
Total	342.0	386.7	403.0	459.3	478.0
Grand Total	3,039.1	3,874.8	4,417.8	4,991.5	5,321.5

[1] Includes solubles, dry weight basis, where separately classified.
[2] Preliminary. [3] Estimated. [4] Exports.

Source: USDA: World Agricultural Production and Trade

THE CHEMICAL AND NUTRITIVE CHARACTERISTICS OF HERRING MEALS PRODUCED ON THE ATLANTIC COAST*

The Fisheries Research Board of Canada published a Technical Report No. 114 under this title in 1969. The authors are H. E. Power, K. A. Savagaon, B. E. March and J. Biely.

Seven years ago herring oil from the Atlantic Coast was largely the by-product of the sardine industry. The realization of the existence of large herring resources in arious areas and in different seasons has led to the construction of reduction plants, particularly in Nova Scotia and Newfoundland.

During the past three years herring meal production on the Atlantic Coast has increased from 25,900 tons to 86,500 tons annually, and herring oil production from 15.8 million pounds to 67.4 million pounds. At the same time the British Columbia herring catch, traditionally Canada's major supply, has dwindled to a trickle, and the industry is waiting for the stocks to recover.

The Fisheries Research Board and the Poultry Science Department of the University of British Columbia undertook the joint study to provide nutritionists and feed manufacturers with analytical data on the Atlantic Coast herring meals.

All plants contributed samples. The sampling procedure has masked variations due to processing methods of individual companies. Seasonal physiological variations of the fish or its origin from different fishing areas seem to have had no significant effect on meal quality.

Only one of the major producers does not have stickwater recovery facilities, and does not produce a "whole meal," thus affecting the water-soluble protein and vitamin content of his meal.

As shown in the tables reproduced from this Report, the results compare favourably with other fishmeals and particularly with herring meal produced on the Pacific Coast.

Seven composite samples have been examined, originating in Newfoundland, the Magdalen Islands, northern New Brunswick and southern Nova Scotia. The proximate analysis shown below indicates considerable uniformity. The average protein content is 73.6 per cent compared with 71.6 per cent for B.C. herring meal.

Proximate Analysis of Atlantic Coast Herring Meals

Sample No.	Moisture %	Ether Extract %	Protein %	Ash %
1	6.1	9.4	73.7	10.6
2	5.9	7.5	75.2	10.0
3	7.1	9.9	72.7	10.3
4	7.5	8.3	72.5	10.4
5	7.1	8.1	73.1	10.4
6	6.7	9.2	74.3	10.6
7	6.5	9.8	73.8	10.4
Average with Standard Deviation	6.7	8.89 ± .922	73.6 ± .945	10.4 ± .202
Average for B.C. Herring Meal	7.74	7.9	71.57	11.04

Depending on the method of analysis, the investigators found averages of 2.1 per cent and 2.6 per cent of calcium; 1.8 per cent and 2.6 per cent of phosphorus, 1.2 per cent of potassium and .15 per cent of magnesium in the meals.

The amino acid composition of the Atlantic herring meals also compared well with averages determined in B.C. herring meals:

Atlantic		B. C.
lysine:	8.13%	8.18%
histidine:	3.17%	2.66%
threonine:	4.51%	4.00%
cystine:	1.02%	1.01%
methionine:	2.74%	2.71%
leucine:	7.88%	7.20%
tyrosine:	3.37%	2.80%
phenylalanine:	4.03%	4.56%
tryptophan:	1.39%	0.91%

The table showing the protein digestibility and lysine availability also indicates good uniformity. There is no evidence of any significant deterioration of protein quality as a result of processing conditions.

Protein Digestibility, Total Lysine and Available Lysine of Atlantic Coast Herring Meals

Sample	Percent of Crude Protein		Total Lysine	Available Lysine
	pepsin (0.2%)* digestibility	pepsin (0.002%)* digestibility	(g/100g protein)	(g/100 protein)
1	94.7	91.6	7.29	8.3
2	93.9	90.4	8.32	7.3
3	94.5	90.7	8.28	7.8
4	94.7	91.7	7.96	8.6
5	94.4	90.0	8.31	7.5
6	94.1	88.6	8.64	7.3
7	95.4	91.2	8.12	7.6
Average with standard deviation	94.5 ± .49	90.6 ± 1.08	8.13 ± .43	7.8 ± .50
Average of B.C. herring meals	92.4	—	8.18	7.0

*Using 0.2 and 0.002% of a 1:10,000 preparation.

The table illustrating the nutritive qualities on the basis of supplemental protein and metabolizable energy values again indicates the degree of uniformity. The authors comment that the low M.E. value in sample No. 4 could be due to problems associated with the initial operation of equipment for the addition of antioxidant.

Nutritive Value of Atlantic Herring Meal

Sample No.	Supplementary Protein Values		Metabolizable Energy Values (Kcal/lb dry weight basis)
	4%	8%	
1	132	108	1640
2	129	109	1575
3	126	112	1580
4	126	109	1425
5	132	117	1540
6	131	113	1625
7	123	109	1622
Average with standard deviation	128.4±3.5	111±3.2	1572±73.8

*The test meals were in the diets to supply 4 and 8% respectively of protein.

*This Report represents a manuscript, and some material will appear in scientific publications. The Report is available from

The Fisheries Research Board of Canada
Halifax Laboratory
P.O. Box 429
Halifax, N.S.

CANADIAN TRADE IN ANIMAL FATS

Imports of tallow registered an increase by 10 million pounds to 17.3 million pounds in 1968. It can be assumed that most of Canada's tallow imports are of an edible grade. Prices dropped to 7.4 cents in mid-1967 and further to 6.3 cents in mid-1968. Trade sources indicate that these low prices resulted in increased imports from the United States.

Inedible tallow exports were constant at about 136 million pounds from 1964-1966. In 1967 exports increased by 7 per cent to 145.8 million pounds. Canada's main commercial customers, Britain, The Netherlands and Japan, all increased their purchases. Shipments to Cuba came to an end, while Pakistan received shipments under special conditions. In 1968 exports rose by 12 per cent. While Canada's major customers again raised their imports, the increase in shipments to Japan to 52 million pounds was particularly significant.

Canadian production of edible tallow has remained constant at about 50 million pounds annually. Inedible tallow production, however, has increased by 32 per cent from 199 million pounds in 1964 to 263 million pounds in 1968, with the sharpest rise occurring in 1968. Preliminary results for the first seven months of 1969 indicate a further increase in inedible tallow production.

Lard imports during 1967 and 1968, all from the U.S., amounted to 24 and 28 million pounds respectively. Total U.S. lard production has been declining and also the average yield per 100 pounds of live weight hog has gone down from 14 pounds in 1956 to 9.5 pounds in 1968. Canadian lard production (Table 72) increased sharply in 1967 as a result of increased hog slaughter. Production and slaughter remained at about the same level in 1968. Calculated on the basis of average weight per hog slaughtered, lard yields declined from about 16.3 pounds per hog in 1964 to 13.9 pounds in 1968.

Canadian imports of animal grease from the United States (Table 69) continued their sharp decline in 1968.

TABLE 66

Canadian Imports of Tallow[1]

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
Australia	7	– –	– –	– –	– –
United States	8,673	8,007	7,002	7,068	17,331
Total	8,680	8,007	7,002	7,068	17,331
Total Value (thousands of $)	799	915	802	632	1,123
Average price (cents per pound)	9.2	11.4	11.5	8.9	6.5

[1] Until 1966 tallow was imported as class #2308 and changed to class 39-126 in 1964.

Source: DBS, Trade of Canada

TABLE 67

Canadian Exports of Inedible Tallow

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	59,954	44,907	41,686	43,480	53,037
Italy	2,040	1,520	2,684	514	1,602
Netherlands	654	13,500	16,684	26,871	32,251
Iran	1,926	– –	1,279	772	– –
Ghana	1,164	2,679	3,261	4,503	2,199
S. Rhodesia	473	– –	– –	– –	– –
Rep. of South Africa	5,377	13,252	9,482	10,354	3,256
Malaysia	100	– –	– –	– –	– –
Japan	23,754	25,456	19,944	29,191	51,909
Korea	110	– –	– –	– –	– –
Guiana	126	457	717	– –	– –
Colombia	250	100	– –	– –	– –
Ecuador	3,515	8,247	1,852	192	– –
Venezuela	221	– –	– –	– –	– –
Barbados	895	1,075	1,040	765	688
Leew.-Wind. Is.	148	263	204	296	614
Trinidad-Tobago	886	3,607	3,235	3,103	2,116
Cuba	35,577	14,277	19,781	2,314	– –
El Salvador	103	2,067	899	– –	– –
United States	598	354	969	4,620	9,776
Germany, West	– –	2,170	660	1,117	412
Spain	– –	998	– –	– –	722
Switzerland	– –	638	– –	706	– –
Surinam	– –	– –	8	49	36
Pakistan	– –	– –	11,957	14,364	– –
France	– –	– –	– –	672	– –
Nigeria	– –	– –	– –	327	– –
Philippines	– –	– –	– –	1,202	441
Haiti, Republic of	– –	– –	– –	379	– –
Algeria	– –	– –	– –	– –	1,744
Guyana	– –	– –	– –	– –	174
Costa Rica	– –	– –	– –	– –	69
Belgium-Luxembourg	– –	– –	– –	– –	4,337
Norway	– –	– –	– –	– –	877
Total	137,872	135,564	136,308	145,791	165,888
Total Value (thousands of $)	10,760	12,512	11,846	9,589	9,178
Average price (cents per pound)	7.8	9.2	8.7	6.6	5.5

Source: DBS, Trade of Canada

TABLE 68

Canadian Imports of Lard

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United States	16,001	20,734	28,439	24,112	28,375
Total	16,001	20,734	28,439	24,112	28,375
Total Value (thousands of $).....	1,647	2,564	3,428	2,075	1,974
Average price (cents per pound)	10.3	12.4	12.1	8.6	7.0

Source: DBS, Trade of Canada

TABLE 69

CANADIAN IMPORTS OF ANIMAL GREASE[1]

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	443	462	277	16	89
Ireland	22	– –	– –	– –	– –
Germany, West	74	63	– –	5	– –
Australia	49	107	169	– –	– –
United States	32,001	14,672	9,898	10,032	2,439
Japan	– –	5	12	– –	– –
Israel	– –	– –	– –	– –	– –
Total	23,589	15,308	10,356	10,053	2,448
Total Value (thousands of $)	1,939	1,558	998	612	160
Average price (cents per lb.)	8.2	10.2	9.6	6.1	6.5

[1] As of January 1967, import class #391-15: Grease, including wool grease and lanolin, was split into class 390-10; Wool Grease and Lanolin, and class 390-11; Animal Grease N.E.S. The data in the above table covers the former class 391-15 up to 1966 and the new class 390-11 as of 1967. Table 71A covers Wool Grease and Lanolin (class 390-10).

Source: DBS, Trade of Canada.

TABLE 69A

Canadian Imports of Wool Grease and Lanolin

(thousands of pounds)

Country of Origin	1967	1968
United Kingdom	269	343
Japan	9	3
Australia	105	144
United States	368	800
Germany, West	–	75
Israel	–	2
Total	751	1,368
Total Value (thousands of $)	155	239
Average price (cents per pound)	20.6	17.5

Source: DBS, Trade of Canada

TABLE 70

Canadian Imports of Animal Oils and Fats[1]

(thousands of pounds)

Country of Origin	1964	1965	1966[2]	1967	1968
Poland	2	–	–	–	–
United States	1,335	748	796	441	733
United Kingdom	–	12	–	–	8
Australia	–	10	6	–	–
Total	1,337	771	804	441	741
Total Value (thousands of $)	174	124	159	89	105
Average price (cents per lb.)	13.0	16.1	19.8	20.2	14.2

[1] Import class #39-199 contains the following items: chicken fat, lard oil, neats food oil, animal stearine, and tallow oil.

[2] In addition to the reported amounts, Canada imported 300 lbs. of product valued at $2,000 from France in 1966.

Source: DBS, Trade of Canada

TABLE 71

Canadian Exports of Animal Oils and Fats

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	553	332	430	3,039	1,303
Germany, West	2	– –	– –	– –	– –
Norway	– –	– –	32	– –	– –
Japan	– –	915	– –	1,212	1,777
Jamaica	– –	46	16	41	44
Trinidad-Tobago	– –	– –	10	– –	– –
Guiana	– –	– –	56	– –	– –
United States	772	482	4,567	4,976	4,834
Italy	650	– –	– –	– –	– –
Finland	41	– –	– –	– –	– –
Bahamas	1	– –	– –	– –	– –
Belgium-Luxembourg	– –	– –	– –	34	– –
Hong Kong	– –	– –	– –	112	– –
India	– –	– –	– –	47	– –
Guyana	– –	– –	– –	– –	2
Bermuda	– –	– –	– –	– –	1
Total	2,019	1,775	5,110	9,460	7,961
Total Value (thousands of $)	159	129	220	558	311
Average price (cents per lb)	7.9	7.3	4.3	5.9	3.9

Source: DBS, Trade of Canada

CANADIAN PRODUCTION OF SPECIFIED FATS AND OILS PRODUCTS

Margarine production in Canada increased by 11 per cent from 175 million pounds in 1964 to 195 million pounds in 1968, with half the increase occurring during the last year. Per capita margarine consumption was estimated to be 9.3 pounds in 1968.

Creamery butter production decreased during the same period by 4.5 per cent. The drop occurred during 1965 to 1966. Production has remained constant for the past three years, and average per capita consumption amounted to about 16 pounds in 1968.

Production and consumption trends in salad oils are not easy to define at the present time. DBS changed the method of classification in 1967. However, from Tables 72, 73 and 73A, it appears that production is currently growing faster than the population.

Total production of all types of fats and oils by Canadian refineries increased from 533 million pounds in 1967 to 555 million pounds in 1968.

TABLE 72

CANADIAN PRODUCTION OF SPECIFIED FATS AND OILS PRODUCTS

	1964	1965	1966	1967	1968	1968	1969
		(millions of pounds)				(Seven months Ended July)	
Margarine[1]	175	167	181	185	195	110	114
Creamery butter	352	352	334	330	335	187	204
Shortening							
Package	54	51	50	48[2]	47	25	23
Bulk	139	140	203[3]	226[4]	240	135	149
Refined Oils							
Coconut	15	15	[5]	—	—	—	—
Salad and cooking	72	74	128	103[6]	114	68	70
Lard	108	97	86	109[7]	103	66	58[9]
Tallow							
Edible	50	50	48	49	50	29	22
Inedible	199	204	194	224	263	144	173
Grease, other than white	6	5	3	17	N/A	N/A	N/A
Other fats and oils[8]	8	7	10	7	N/A	N/A	N/A

TABLE 72 (footnotes)

[1] Starting in 1967 margarine data covers manufacturers' sales, both retail and commercial.

[2] Retail packages up to 20 lbs. only; and manufacturers' sales as of 1967.

[3] Includes packages more than 20 lbs.

[4] As of 1967 covers commercial (21-450 lbs. packaged), bulk and other but packaged retail sales of manufacturers of shortening and deodorized shortening oil. This new class includes baking and frying fats and oils.

[5] Included with shortening oils starting in 1966.

[6] Starting in 1967 this category includes only salad oils; cooking oils when specifically made for this purpose, are listed with shortening oils.

[7] Covers production of rendered lard only and not any further processed lard.

[8] Includes white grease, neats foot oil, oleo oil, oleo stearine, oleo stock, etc.

[9] Data only for six months ending June, 1969.

Source: Based on DBS data

TABLE 73

CANADIAN PRODUCTION OF DEODORIZED FATS AND OILS

(millions of pounds)

	1967				(Seven Months ended JULY 1968)			
	Margarine Oil	Shortening Oil	Salad Oil	TOTAL	Margarine Oil	Shortening Oil	Salad Oil	TOTAL
VEGETABLE OILS								
Coconut	0.8	26.7	—	27.6	0.1	14.4	—	14.5
Corn	x	x	x	24.4	x	x	x	13.6
Cottonseed	x	x	x	9.1	x	3.2	x	4.3
Palm	x	12.5	x	19.9	4.1	6.1	—	10.2
Palm kernel	—	9.4	—	9.4	—	5.4	—	5.4
Peanut	x	x	x	26.8	—	x	x	14.7
Rapeseed	36.2	38.7	26.9	101.7	17.4	26.5	23.1	67.0
Soybean	53.9	70.7	29.1	153.7	30.8	37.8	15.9	84.5
Sunflowerseed	x	x	27.6	33.0	2.5	4.5	19.6	26.5
Other Vegetable	x	x	—	0.1	—	0.2	0.7	0.9
TOTAL	106.0	188.7	111.1	405.8	58.3	110.2	73.1	241.6
MARINE OILS								
Herring	32.9	18.8	—	51.7	21.0	8.1	—	29.1
Seal	[1]	—	—	[1]	0.7	0.3	—	1.0
Whale	—	—	—	—	0.2	0.2	—	0.4
Other marine	[1]	[1]	—	[1]	—	0.2	—	0.2
TOTAL	32.9	18.8	—	51.7	21.9	8.9	—	30.8
ANIMAL FATS								
Lard	3.0	28.5	—	31.5	2.0	14.8	—	16.9
Oleo, all types	[2]	[2]	—	[2]	—	1.7	—	1.7
Tallow, edible	[2]	44.3	—	44.3	0.3	25.3	—	25.6
TOTAL	3.0	72.7	—	75.7	2.3	41.8	—	44.1
TOTAL, all types:	141.9	280.2	111.1	533.2	82.5	160.9	73.1	316.5

x Confidential data.

[1] Small amount included with herring.

[2] Small amount included with lard.

Source: DBS No. 32-006

TABLE 73A

CANADIAN PRODUCTION OF DEODORIZED FATS AND OILS

(millions of pounds)

	1968				(Seven Months Ended JULY 1969)			
	Margarine Oil	Shortening Oil	Salad Oil	TOTAL	Margarine Oil	Shortening Oil	Salad Oil	TOTAL
VEGETABLE OILS								
Coconut	0.1	24.5	—	24.6	—	14.0	—	14.0
Corn	x	x	x	24.7	x	x	x	12.8
Cottonseed	x	x	x	7.3	x	8.3	x	9.0
Palm	6.9	11.9	27	18.8	x	x	—	15.6
Palm kernel	—	9.6	—	9.6	x	x	—	5.8
Peanut	—	x	x	24.8	—	x	x	11.4
Rapeseed	32.8	46.0	37.9	116.7	21.4	24.9	28.7	75.0
Soybean	51.2	70.4	24.6	146.2	31.2	46.8	11.1	89.1
Sunflowerseed	4.7	8.3	35.3	48.3	x	7.0	x	28.1
Other vegetable	[1]	0.5	0.7	1.2	—	0.1	—	0.1
TOTAL	101.9	197.1	123.0	422.1	62.5	125.2	73.3	261.1
MARINE OILS								
Herring	35.7	14.8	—	50.4	21.6	11.0	—	32.6
Seal	3.2	1.1	—	4.2	0.5	0.3	—	0.8
Whale	0.3	0.3	—	0.6	0.3	—	—	0.3
Other marine	—	0.2	—	0.2	—	0.2	—	0.2
TOTAL	39.1	16.3	—	55.4	22.5	11.5	—	34.0
ANIMAL FATS								
Lard	3.8	24.8	—	28.6	1.0	12.1	—	13.1
Oleo, all types	—	5.1	—	5.1	—	1.8	—	1.8
Tallow, edible	[1]	43.5	—	43.5	[1]	25.5	—	25.5
TOTAL	3.8	73.3	—	77.1	1.0	39.5	—	40.4
Total, all fats and oils	144.8	286.8	123.0	554.6	85.9	176.2	73.3	335.4

x Confidential data.
[1] Very small amount.

Source: DBS No. 32-006

TABLE 74

Canadian Imports of Margarine and Shortening

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	60	112	– –	– –	– –
Sweden	264	156	180	569	316
United States	4,804	3,258	4,316	3,565	4,575
Total	5,129	3,526	4,496	4,134	4,891
Total Value (thousands of $)	805	721	935	767	927
Average price (cents per lb.)	15.7	20.4	20.8	18.6	19.0

Source: DBS, Trade of Canada

TABLE 75

Canadian Exports of Margarine, Shortening and Lard[1]

(thousands of pounds)

Destination	1964	1965	1966	1967	1968
United Kingdom	–	0.9	–	–	–
Netherlands	8.4	14.3	16.0	–	–
Cuba	–	0.4	–	–	1
Bahamas	1.0	–	–	3	14
Bermuda	43.1	68.2	55.4	47	53
St. Pierre et Miquelon	32.7	48.3	91.2	79	90
Jamaica	14.3	11.0	–	–	–
United States	4.4	4.0	5.1	6	4
Leew.-Wind. Is.	0.4	–	–	–	–
Norway	–	0.2	–	–	–
Japan	–	21.0	59.7	47	25
Germany, West	–	–	–	7	13
Thailand	–	–	–	–	1
Total	104	168	228	191	201
Total Value (thousands of $)	27	42	61	50	51
Average price (cents per lb)	26.0	25.0	26.8	26.2	25.4

[1] Includes lard, starting in 1966.

Source: DBS, Trade of Canada

BUTTERFAT PRODUCTION AND UTILIZATION

Canadian whole milk production amounted to 18.3 billion pounds in 1968. The total milk output has varied by less than one per cent during the past four years. The total butterfat equivalent has, therefore, also remained constant and amounted to 640 million pounds in 1968.

Nearly 64 per cent — 408 million pounds — of the total butterfat production went into manufactured dairy products and 28 per cent of all butterfat passed to the consumer through fluid milk sales. Of the remaining 8 per cent, 4.5 per cent was consumed in farm homes and nearly 4 per cent was fed to livestock. This distribution pattern has also remained constant.

The utilization of butterfat in various manufactured dairy products has also not changed significantly in 1968 as compared with 1967. Most of the butterfat is sold as creamery butter — 274 million pounds or 42.8 per cent of the total butterfat production. Next in importance is the use of butterfat in cheese production, accounting for nearly 12 per cent. Concentrated whole milk products utilized 4.4 per cent and ice cream 4.1 per cent of Canada's butterfat output. It appears that the growth curve of cheese and ice cream production is levelling off.

Direct Federal subsidy payments were raised on April 1, 1968 to $1.16 per hundred pounds for 3.5 per cent processing milk and to an equivalent rate for cream of 36.42 cents per pound butterfat. In August 1968 the payments for milk were reduced to $1.10, but those for cream remained unchanged.

Ontario and Quebec also paid subsidies on manufacturing milk and cream to producers. Total federal and provincial direct payments amounted to $109.7 million in 1968 and $103.2 million in 1967.

Dominion Bureau of Statistics reports that the domestic disappearance of creamery butter declined to 332 million pounds, or 16 pounds per capita in 1968 from 337 million pounds, or 16.5 pounds per capita in 1967.

The following table shows the Canadian per capita consumption for various dairy products in terms of butterfat.

	1966	1967	1968
		(pounds)	
Fluid whole milk[1]	10.9	10.6	10.3
Total butter[2]	14.4	13.7	13.3
Total cheese[3]	3.1	3.4	3.5
Concentrated whole milk production[4]	1.4	1.4	1.3
Ice cream	1.1	1.3	1.3
Total butterfat disappearance	30.9	30.4	29.7

[1] Includes fluid sales together with milk and cream used in farm homes.

[2] Includes creamery butter, farm butter and whey butter.

[3] Includes cheddar cheese used as such, process cheese and other cheeses made from whole milk and cream.

[4] Includes evaporated milk, condensed milk, milk powder, partly skimmed evaporated milk and a variety of minor products.

Total per capita butterfat consumption has declined by four per cent since 1966 to 29.7 pounds in 1968.

However, it remains the most important individual fat in the Canadian diet.

TABLE 76

CANADIAN TRENDS IN BUTTER FAT PRODUCTION AND UTILIZATION

(millions of pounds)

	Total Milk Production			Butter Fat Utilization		
	Whole Milk	Butter Fat Equivalent[1]	Manufactured Dairy Products[2]	Fluid Milk Sales[3]	Farm Home Consumed	Fed on Farms
1962	18,382	643	405	174	33	31
1963	18,432	645	406	176	33	30
1964	18,505	647	407	179	32	29
1965	18,357	641	402	182	31	27
1966	18,373	643	404	183	30	25
1967	18,228	638	403	182	30	24
1968	18,335	640	408	179	29	24

BUTTER FAT UTILIZATION IN MANUFACTURED DAIRY PRODUCTS[4]

	TOTAL	Creamery Butter	Cheese[5]	Concentrated Whole Milk Products	Ice cream Mix
1962	399	296	50	33	19
1963	400	288	60	35	17
1964	403	288	56	35	17
1965	399	276	69	35	19
1966	401	274	75	30	22
1967	399	270	74	29	26
1968	406	274	76	28	26

[1] Fat content of milk based on conversion rate of 3.5%

[2] Includes creamery butter, cheddar cheese (bulk of all Canadian cheese production, about 82% on a whole milk basis), other cheese, concentrated whole milk products, ice cream mix, and also a small volume of farm butter.

[3] Fluid milk sales represent whole milk sales from farms for use in milk and cream.

[4] Farm butter excluded.

[5] Includes mainly cheddar cheese, and also other cheese made from whole milk and cream, but excludes creamed cottage cheese.

Source: Based on DBS data

TABLE 77

Canadian Imports of Vegetable Cooking Fats

and Packaged Salad Oils

(thousands of pounds)

Country of Origin	1964	1965	1966	1967	1968
United Kingdom	561	694	480	912	288
Sweden	78	111	127	38	102
United States	3,503	8,448	7,107	1,255	1,170
Switzerland	– –	– –	– –	1	5
Germany, West	– –	– –	– –	– –	4
Total	4,143	9,254	7,714	2,206	1,569
Total Value (thousands of $)	992	2,517	2,050	376	296
Average price (cents per pound)	23.9	27.2	26.6	17.0	18.9

This class was established in 1964 as #39385 and includes vegetable cooking fats and packaged salad oils, a group called lard substitutes, but not shortening.

Source: DBS Trade of Canada.

TABLE 78

Canadian Production of Salad Dressings and Mayonnaise

(millions of pounds)

	1963	1964	1965	1966	1967	1968
1st Quarter	10.0	10.6	13.0	12.7	13.6	15.9
2nd Quarter	16.4	17.3	17.2	19.7	22.8	20.9
3rd Quarter	9.1	9.1	10.9	14.7	13.8	14.4
4th Quarter	8.1	9.0	9.8	10.5	10.9	11.3
	43.6	46.0	50.8	57.7	61.1	62.5

Source: DBS No. 32-018
"Miscellaneous Food Preparations"

TABLE 79

Canadian Production of Sandwich Spreads[1]

(thousands of pounds)

	1963	1964	1965	1966	1967	1968
1st Quarter	1,138	981	1,173	1,661	1,535	1,380
2nd Quarter	1,147	1,391	1,332	1,376	1,284	1,093
3rd Quarter	780	1,024	1,077	1,260	1,194	953
4th Quarter	998	1,023	988	1,283	896	1,437
	4,063	4,418	4,570	5,581	4,909	4,863

[1] Excluding meat and poultry paste

Source: DBS No. 32-018
"Miscellaneous Food Preparations"

TABLE 80

Canadian Production of Peanut Butter

(millions of pounds)

	1963	1964	1965	1966	1967	1968
1st Quarter	10.5	12.0	12.9	13.0	14.6	15.0
2nd Quarter	10.0	11.7	10.5	11.9	11.8	11.8
3rd Quarter	10.3	11.1	11.1	10.0	13.3	12.9
4th Quarter	8.6	10.4	11.1	11.2	11.7	12.2
	39.4	45.2	45.5	46.2	51.4	51.9

Source: DBS No. 32-018
"Miscellaneous Food Preparations"

TABLE 81

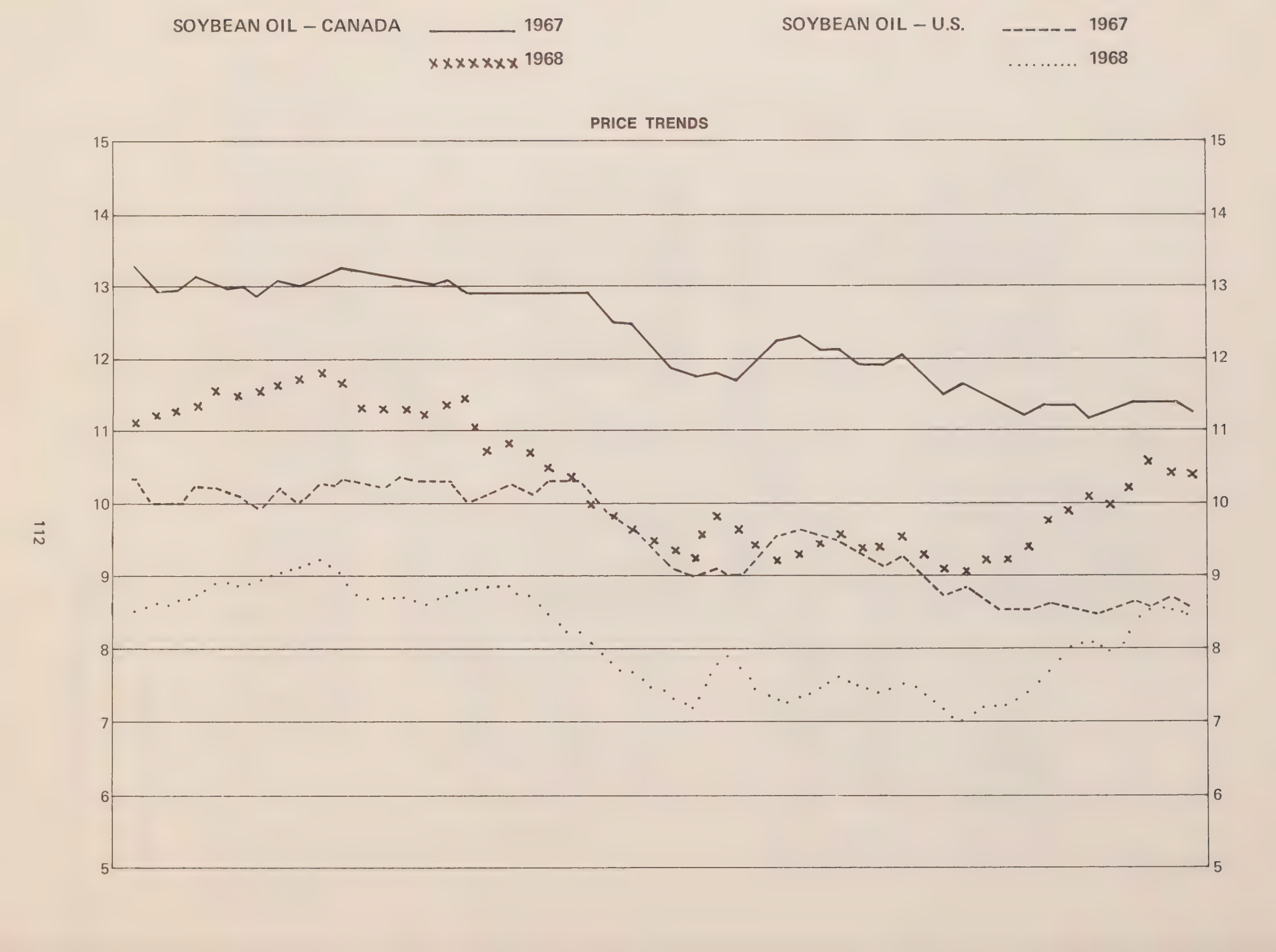
Average Retail Prices for Canada for Certain Fats

(cents)

	1964	1965	1966	1967	1968	Jan.*	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Margarine, lb.	29.3	33.9	36.0	35.4	33.9	35.0	34.4	34.2	34.1	33.8	34.0	33.9	33.6	33.6	33.5	33.1	33.8
Shortening, lb.	35.9	38.7	40.9	40.2	39.3	39.9	39.7	39.7	39.1	39.1	39.2	39.1	39.2	39.5	39.5	39.1	38.8
Lard, pure, lb.	23.7	27.2	30.1	27.4	22.8	24.6	24.0	23.4	23.0	22.8	22.5	22.2	22.3	22.1	22.3	21.9	22.7
Salad dressing jar, 16 oz.	42.6	44.0	44.4	43.7	43.2	43.7	43.5	43.2	43.3	43.3	43.3	43.3	43.1	42.9	42.8	42.7	42.8
Butter, creamery, first grade, lb.	58.9	61.4	67.1	70.4	70.9	71.0	70.9	70.7	70.8	70.8	70.4	70.5	70.2	70.2	70.8	72.3	72.4

* – The months cover the year 1968

Source: DBS, Prices and Price Indexes, No. 62-002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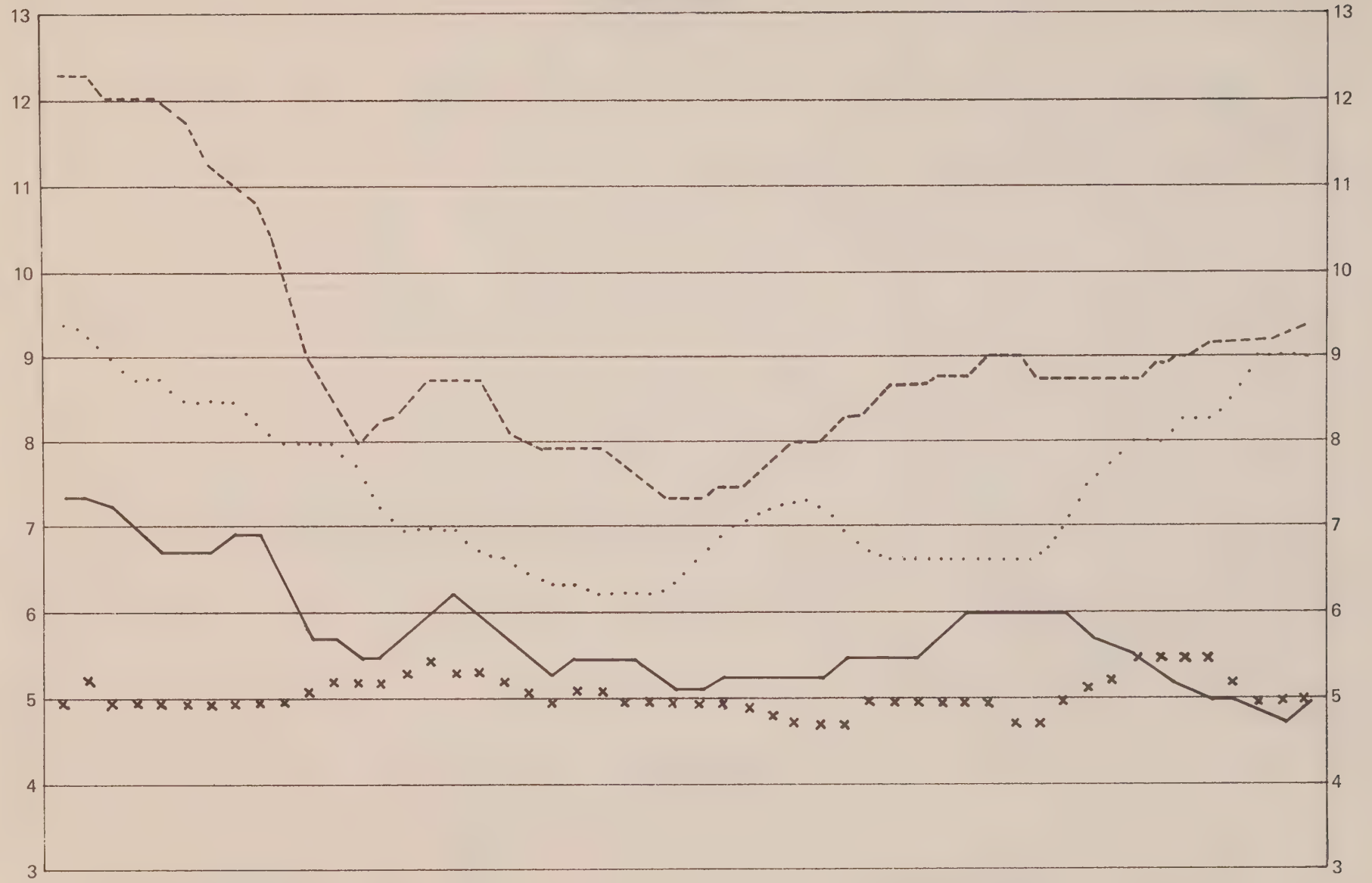

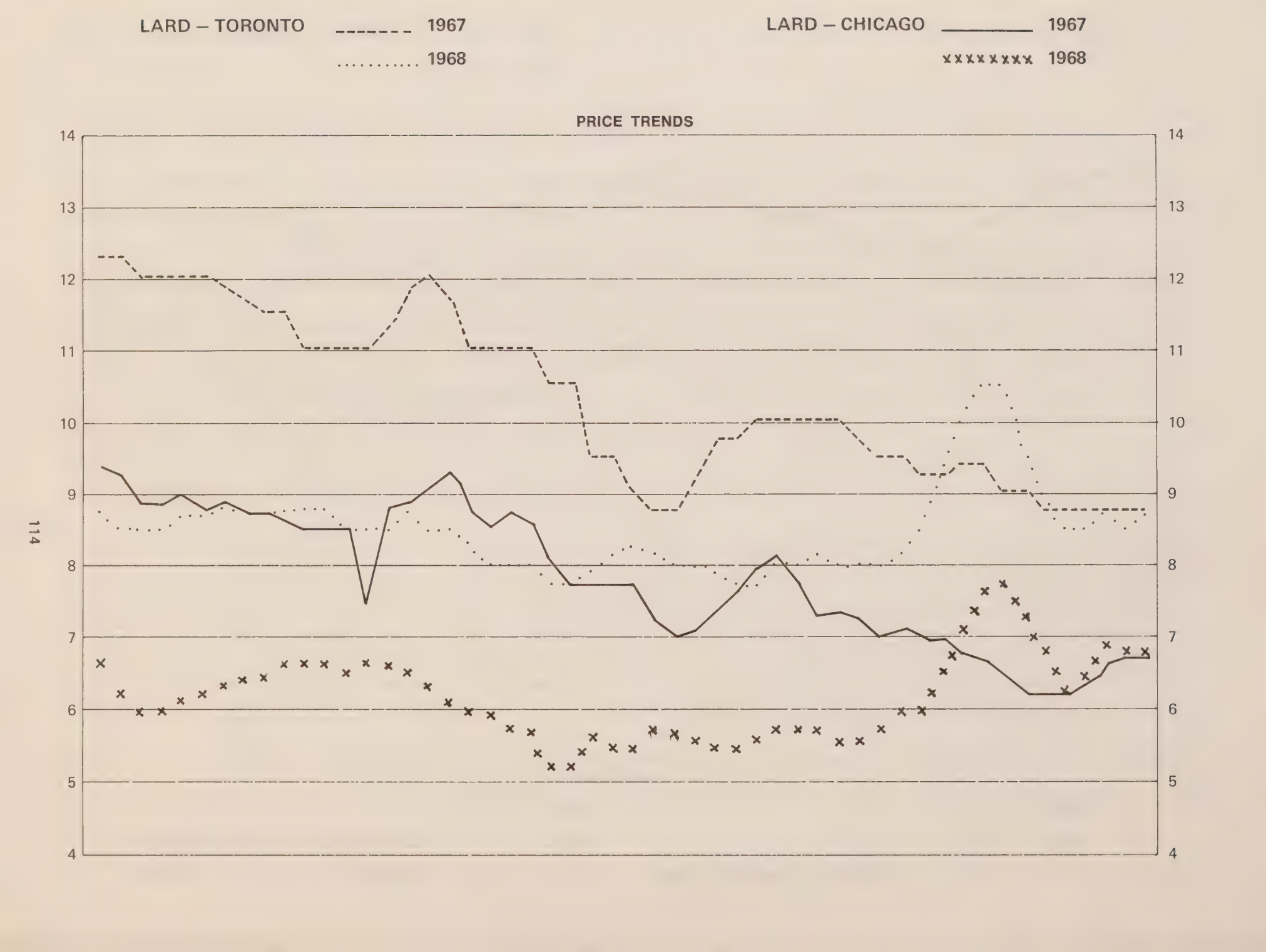
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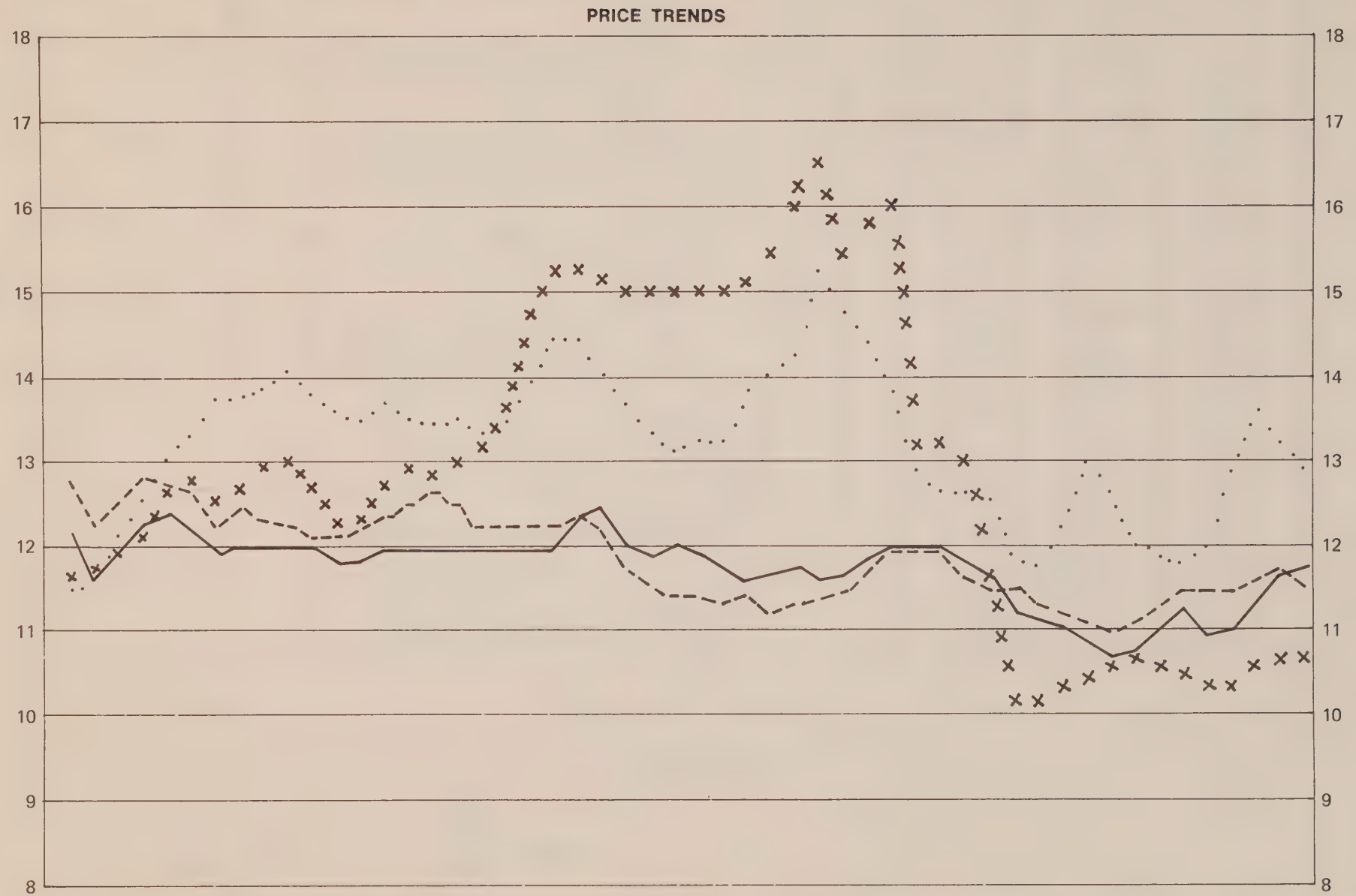

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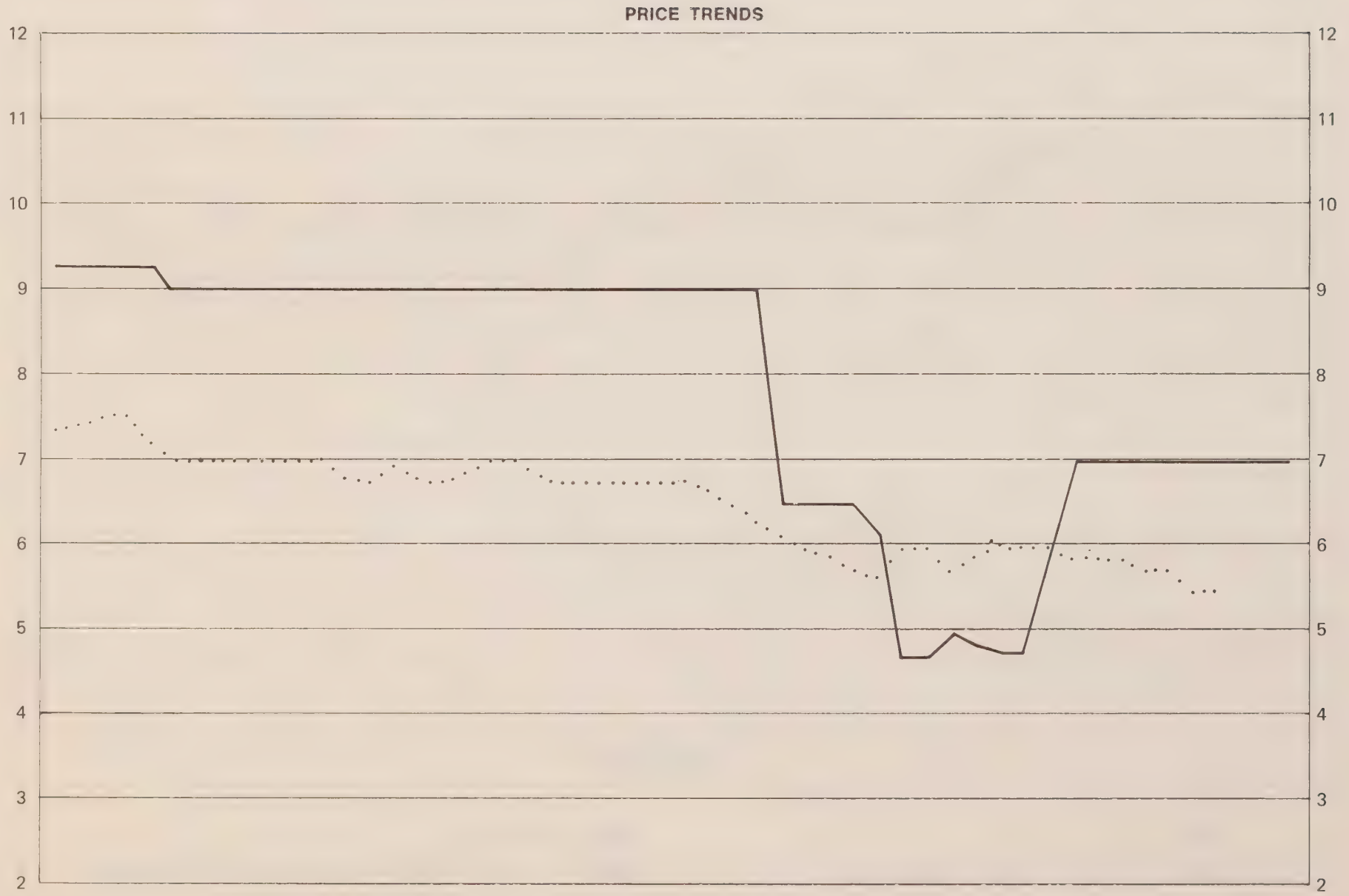

MARGARINE PRODUCTION IN THE UNITED STATES

Annual per capita consumption of margarine has been constant at about 10.6 pounds for the past three years. Canadian per capita consumption amounts currently to 9.3 pounds. Butter consumption in the United States is at the 5.6 pound level compared with 16 pounds in Canada.

The following two tables review the United States margarine production and the oils used in their manufacture in 1968.

Of more than 2.1 billion pounds of total output, 87 per cent was sold in one-pound units. Soft margarines accounted for 13 per cent of all U.S margarines. Canadian soft margarine production is still said to be below 5 per cent of the total. Industrial margarines represent 8 per cent of the total.

While Canadian margarines contain a broad spectrum of oil ingredients, soybean oil, accounts for 72 per cent of all oils used. Corn oil holds the second place with 10.4 per cent. Since corn oil margarines are usually sold as "pure corn oil margarines," this raises the percentage of soybean oil in the other products. The same applies to safflower oil, which accounted for 2.4 per cent in 1968.

Among animal fats, only lard is used in the United States, accounting for 9 per cent of all ingredients.

UNITED STATES MARGARINE PRODUCTION IN 1968

(millions of pounds)

Month	Total Production	One-pound Units	Soft (includes soft "imitation margarine")	Other than Soft	All other Consumer Sale Units (including country pats)	Individual Servings (chips, patties, reddies)	Bakery Other Industrial (over 1-lb.)
January	203.3	179.0	27.7	151.3	6.0	2.1	16.1
February	192.7	169.8	27.3	142.5	5.3	2.5	17.2
March	177.5	155.7	23.5	132.2	5.0	2.0	15.6
April	170.8	148.3	22.3	126.0	6.4	1.6	12.6
May	161.5	143.5	20.8	122.7	4.5	1.6	12.7
June	160.9	145.7	22.0	123.7	4.3	1.6	12.1
July	162.3	140.4	20.1	120.3	9.3	1.5	13.1
August	168.0	138.3	21.0	117.3	9.8	1.5	14.2
September	168.0	146.6	22.3	124.3	10.5	1.8	15.2
October	199.7	169.4	26.1	143.3	12.1	2.0	15.5
November	179.6	152.3	22.3	130.0	10.1	1.7	14.9
December	194.9	170.8	25.0	145.8	13.1	1.8	12.1
TOTALS	2,139.2	1,859.8	280.4	1,579.4	96.4	21.7	171.3

Source: Bureau of the Census, U.S. Department of Commerce

United States Margarine: Fats and Oils Used in Manufacture

(millions of pounds)

	1965	1966	1967	1968
Soybean Oil	1,112	1,294	1,249	1,240
Cottonseed Oil	114	106	78	70
Peanut Oil	4	6	5	4
Corn Oil	161	157	176	179
Coconut Oil	5	12	15	14
Safflower Oil	10	46	42	42
Other Vegetable	14	1	4	3
Lard	100	82	125	153
Beef Fats	14	5	10	15
	1,534	1,709	1,704	1,720

CONVERSION FACTORS

Oilseeds:

Statutory Weight per Bushel and Average Volume per Short ton

	Pounds	Cubic Feet
Flaxseed	56	45.9
Soybeans	60	42.8
Rapeseed	50	51.4
Sunflowerseed	30	85.7
Mustard Seed	–	51.4

Oilseed Products:	Extraction Rate (Per cent)	Yield per Bushel (Pounds)	Weight of Gallon (Pounds)
Flaxseed, Oil	35.4	19.8	9.3
Linseed meal	61.7	34.6	–
Soybeans, Oil	17.7	10.6	9.2
Meal	80.0	47.3	–
Rapeseed, Oil[1]	40.0	20.0	9.1
Meal	57.5	28.75	–
Sunflowerseed, Oil[2]	40.0	12.0	9.2
Meal	38.0	11.4	–
Mustard Seed[3], Oil (yellow)	28	–	–
Oil (oriental)	40	–	–
Oil (brown)	36	–	–

(1) Rapeseed oil yields seem to have reached a fairly stable level of about 40 per cent on an "as received" basis. The previous factor of 37.5 per cent has been changed accordingly.

(2) The introduction of new sunflowerseed varieties has increased the oil yield on crushing to the 40 per cent level. The previous factor of 36 per cent has been changed accordingly. The meal yields continue to show fluctuations, and this factor has not been changed.

(3) Mustard seed is not crushed in Canada, and is primarily used for condiment purposes. Yellow, oriental and brown mustard seed varieties are grown in Canada, and the theoretical extraction rates reflect average oil contents of the seed, calculated on a dry basis.

Other Products:

Marine Oils: 1 Imperial gallon = 9.25 lbs.